

Sexual Practices and HIV Prevention Strategies Used by Female Sex Workers in Lagos, Nigeria: An Assessment of the Willingness to Use a Microbicide

Sabdat Ozichu Ekama¹, Anandi N Sheth², Margaret O Ilomuanya³, Jane Ogoamaka Okwuzu¹, Adesola Zaidat Musa¹, Ifeoma Idigbe¹, Paschal Mbanefo Ezeobi¹, David Ayoola Oladele¹, Oliver Chukwujekwu Ezechi¹, Babatunde Lawal Salako¹

¹Clinical Sciences Department, Nigerian Institute of Medical Research, Yaba, Lagos, P.M.B 2013, Nigeria; ²Department of Medicine, Division of Infectious Diseases, Emory School of Medicine, Atlanta, GA, USA; ³Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmacy, University of Lagos, Lagos, Surulere, P.M.B 12003, Nigeria

Correspondence: Sabdat Ozichu Ekama, Clinical Sciences Department, Nigerian Institute of Medical Research, 6 Edmund Crescent, Yaba, Lagos, P.M.B 2013, Nigeria, Tel +2348033220908, Email sabdatekama@gmail.com

Background: Female sex workers have a 13-fold higher risk of acquiring HIV than women who do not engage in sex work. The willingness and acceptability of a product is crucial for the development of microbicides. This research aimed to evaluate the sexual practices, existing HIV prevention methods, and willingness to use a microbicide for HIV prevention among female sex workers in Nigeria. We also explored factors that might influence their willingness to use a new microbicide product.

Methods: A cross-sectional study was conducted among female sex workers recruited from brothels within Lagos-Nigeria, in which participants were selected via purposive sampling over a period of five-months. An interviewer-administered, semi-structured questionnaire was used to obtain information. Descriptive statistics were used to present the results, and a multiple logistic regression model was used to determine the factors associated with willingness to use a microbicide.

Results: A total of 461 female participants with a mean-age of 29.63 ± 8.8 years were included in the analysis of which 34.3% had >4 sexual partners, 91.8% used condoms, 53.6% engaged in anal sex, 69.6% had experienced condom rupture, and 31% would “accept unprotected sex” if the male partner refuses to use a condom. Approximately 43% had received PEP, of which only 15% completed the one-month PEP-regimen. On the other hand, 64.6% had taken PrEP medications, of which 28% admitted skipping doses. Although 41% were concerned about male partner acceptance, a total of 95% will be willing to use a microbicide. The number of sexual partners ([aOR] 1.555; 95% CI 1.035–2.335), use of condoms ([aOR] 4.701; 95% CI 1.418–15.584), and condom rupture experience ([aOR] 2.550; 95% CI 1.817–7.959) were associated with greater odds of willingness to use an HIV microbicide.

Conclusion: There is a high level of willingness to use a future microbicide among the female commercial sex workers in this study. In addition, majority of the participants will prefer a microbicide product that is female controlled, affordable, and provided as an over-the-counter medication. This cohort of women engage in high-risk sexual practices and play a significant role in HIV prevention efforts. Therefore, their product preferences and concerns should be considered in microbicide development to enhance the acceptability, adherence, and efficacy of future microbicides.

Keywords: commercial sex workers, vaginal microbicides, HIV prevention

Introduction

Heterosexual intercourse is a major mode of male-to-female HIV transmission that predisposes women to a higher global prevalence of HIV.^{1,2} Globally, there has been a decline in HIV morbidity and mortality due to antiretroviral treatment options over the years; however, new infections continue to occur among key populations.³ In sub-Saharan Africa, young

women aged 15–24 years are vulnerable and disproportionately affected.⁴ This has led to the need to intensify efforts towards HIV infection prevention strategies and the development of preventive measures such as microbicides that offer HIV pre-exposure prophylaxis (PrEP).

Microbicides are compounds applied through the vagina or rectum to prevent HIV or sexually transmitted infections.⁵ There is an urgent need to design suitable and effective microbicides for prevention in women. Poor adherence to microbicides in previous clinical trials has been a major challenge, and a survey on product preferences is crucial.⁶ Although the CAPRISA trial using a 1% tenofovir gel reported a 39% reduction in HIV acquisition thus, giving hope for microbicide development,⁷ its claims were not validated by other studies.^{8,9} However, the aftermath of that trial was the quest to identify the gaps in the microbicide product with the goal of improving its prior efficacy.⁴

The willingness and acceptability of a product are crucial parts of microbicide development and must be assessed among the potential end users of a product to inform product design preferences.¹⁰ The willingness, perceived acceptability, and preferences of likely end users will serve as a guide for the development of an optimal and suitable microbicide product. User-specific factors play a major role in the use and effectiveness.¹¹

Several prophylactic measures against HIV transmission have been put in place such as prevention of mother-to-child transmission (PMTCT), post-exposure prophylaxis (PEP), use of condoms and more recently pre-exposure prophylaxis (PrEP).¹²

Prevention of mother-to-child transmission (PMTCT) programmes offer a range of services (at conception, throughout pregnancy, labour and during breastfeeding) for women living with HIV to maintain their health and prevent the transmission of the virus to their infants.¹³

Post-exposure prophylaxis (PEP) is an HIV prevention strategy where HIV negative individuals take HIV medications after possible exposure to an HIV infected person to reduce their risk of becoming infected. PEP treatment is a month-long course of antiretroviral drugs administered to exposed individuals who are at risk of HIV infection, which must commence within 72 hours after exposure.¹⁴

Condoms are the most popular preventive measure, but their use has associated challenges. In addition, women are disadvantaged because it requires male partner consent which limits its satisfactory use among this group.¹⁵

Pre-exposure prophylaxis is the use of antiretroviral drugs among HIV negative individuals to prevent HIV infection before possible contact with an infected person, especially in individuals who are at high risk or in a Sero-discordant relationship where one partner is HIV positive, and the other partner is HIV negative.¹⁶ Pre-exposure prophylaxis treatment is offered in the form of oral drugs or microbicides for vaginal or rectal application.¹⁷

The microbicide product in question is designed for use by women; however, the needs of various categories of women differ. Female sex workers have a 13-fold higher risk of HIV acquisition than women who do not engage in sex work.¹⁸ Therefore, there is a need to investigate acceptance specifically among women who engage in sex work. Some studies have reported that partner-related factors may affect the willingness and acceptance of microbicides.^{19,20}

Commercial sex work is characterized by the provision of sexual favors for financial or non-financial rewards, which may come with unique considerations for microbicide product development. Furthermore, female sex workers engage in high-risk sexual behaviours which fuels HIV transmission.

In Nigeria, the majority of female sex workers are young women, and they operate in bars, hotels, redlight districts and brothels. Some studies have reported the involvement of some students of tertiary institutions in some organized level of prostitution.²¹ Therefore, the opinion and challenges of this group are vital for planning product development.

This study was conducted among female sex workers to assess the sexual practices, HIV prevention methods, willingness, and identify factors associated with the willingness to use a microbicide product.

Material and Methods

Study Design

A cross-sectional study conducted among female sex workers recruited from brothels within Lagos, in which participants were selected via purposive sampling over a period of five months from May to September 2023. An interviewer-administered semi-structured questionnaire was used to obtain information on sociodemographic characteristics, sexual

practices, HIV prevention methods, challenges experienced with HIV prevention methods, vaginal product preferences, and the willingness to use microbicides. Descriptive statistics were used to present the results, and a multiple logistic regression model was used to determine the factors associated with willingness to use a microbicide.

Study Setting

This study was conducted in Lagos, Nigeria's most populous city and a major economic focal point. It has its capital in Ikeja, with an estimated population of 28 million as of 2022. Lagos significantly influences commerce, tourism, fashion, education, entertainment, technology, arts, and politics and is thus known as the megacity with the fourth highest GDP in Africa. Purposive sampling was used to select 30 brothels from 12 local government areas in Lagos State, namely mainland Lagos, Mushin, Apapa, Oshodi-Isolo, Alimosho, Kosofe, Ibeju-Lekki, Ikorodu, Eti-Osa, Surulere, Agege, and Ikeja.

Sample Size Calculation

Sample size was calculated using the formula for calculating adequate sample size in prevalence studies.²² A total number of 461 participants gave consent and were recruited for the study.

Study Population

The participants were female sex workers aged between 18 and 55 years who operated in brothels within Lagos State, Nigeria, and provided consent to participate in the study.

Participants' Selection

The selection of the participants was via purposive sampling and based on accessibility because not all brothels gave access to their facilities.

Two female sex workers with tertiary education were identified and trained to administer the questionnaires. These female sex workers were able to liaise with the 'managers and madams' of each of the brothels to make access easier.

Confidentiality was maintained, the female sex workers were allowed to fill in their initials or code names, and the questionnaires were administered within the brothels.

Data Management

The data obtained were entered into an Excel spreadsheet and analysed using SPSS Version 26. The results are presented using descriptive statistics. Bivariate and multivariate logistic regression models were used to identify factors associated with willingness to use a microbicide.

Ethical Considerations

Written informed consent was obtained from all the participants. Ethical approval for this study was obtained from the Ethics Committee of the Institutional Review Board of the Nigerian Institute of Medical Research (Protocol No: IRB/22/027). The participants were informed about the purpose of this study, which was conducted in accordance with the Declaration of Helsinki.

Results

A total of 461 participants took part in the study with a mean age of 29.63 63 (\pm standard deviation [SD] 8.8) years (Table 1). Majority were of the age group 18–25 years (42%), single (64.2%), Christian (69.2%), had no engagement in other business (38.4%), had more than four sexual partners (34.3%), and of the Yoruba ethnic group (33.9%).

An assessment of the respondent's awareness (Table 2) showed that 91.3% were aware that HIV can be acquired through sexual intercourse, whereas 92.8% were aware that unprotected sexual intercourse can expose an individual to sexually transmitted infections. Approximately 11% of the respondents had heard of the word microbicide, while most of the respondents had heard of HIV pre-exposure prophylaxis (84.8%) and post-exposure prophylaxis (86.6%).

A large number of the participants were willing to use a microbicide (95%) and preferred women-controlled microbicides (90%) provided as an over-the-counter medication (90%). Furthermore, 72% will be willing to disclose

Table 1 Characteristics of Respondents

Participant's Characteristics N = 461	Frequency (%)
Mean age	29.63 ± 8.8
Age Group	
18 –25	193 (42)
26–35	148 (32)
36–45	90 (19.5)
46–55	30 (6.5)
Level of Education	
Primary	170 (36.9)
Secondary	227 (49.2)
Tertiary	30 (6.5)
Non formal	34 (7.4)
Marital Status	
Single	296 (64.2)
Married	39 (8.5)
Separated/ Divorced/ Cohabiting	126 (27.3)
Engagement in other business	
Other Engagement	284 (61.6)
No other engagement	177 (38.4)
Religion	
Christianity	319 (69.2)
Islam	141 (30.6)
Traditional religion	1 (0.22)
Ethnic Group	
Yoruba	156 (33.9)
Hausa	73 (15.8)
Igbo	132 (28.6)
Other tribes	100 (21.7)
Number of sexual partners	
1	67 (14.5)
2	80 (17.4)
3	76 (16.5)
4	80 (17.4)
>4	158 (34.3)

to their partners about microbicide use and will be bold enough to buy a microbicide (91.3%) but will prefer it if microbicides are provided for free (93.5%).

In terms of sexual and HIV prevention practices, 88.5% of the respondents were sexually active, had more than one sexual partner (85.5%), and 53.6% engaged in anal sex. The use of condoms was high among the respondents, as 91.8% admitted to their use. Interestingly, 69.6% have experienced a condom rupture during sexual intercourse. In addition to condom use, the respondents have also explored other HIV prevention measures such as pre-exposure prophylaxis (64.6%) and post-exposure prophylaxis (43%).

Feedback from the respondents regarding their experiences with condoms and microbicide product preferences is presented in Table 3. The respondents had a higher preference for male condoms (92.4%), and 31% would accept having sexual intercourse if the male partner refused to use a condom. In the event of a condom rupture during sexual intercourse, there were varied responses regarding the course of action taken, including self-medication

Table 2 Assessment of the Awareness, Willingness, and HIV Prevention Practices Among Respondents

Assessment	Response (%)	
	Yes	No
Awareness of HIV transmission		
Are you aware you can acquire HIV through sexual intercourse?	421 (91.3)	40 (8.7)
Are you aware that unprotected sexual intercourse can expose you to sexually transmitted infections (STIs and HIV)	428 (92.8)	33 (7.2)
Have you heard about Post Exposure Prophylaxis (PEP)?	399 (86.6)	62 (13.4)
Assessment of microbicide preferences		
Have you heard of the word microbicide?	49 (10.6)	412 (89.4)
Are you willing to use a microbicide?	438 (95)	23 (5)
Would you prefer a women-controlled microbicide?	415 (90)	46 (10)
Would you prefer microbicides provided as an OTC medication?	415 (90)	46 (10)
Would you be bold to buy a microbicide?	421 (91.3)	40 (8.7)
Will you be willing to disclose to your partner on microbicide use?	332 (72)	129 (28)
Would you prefer if microbicides are provided free?	431 (93.5)	30 (6.5)
Are you concerned that microbicide would decrease sexual pleasure?	217 (47.1)	244 (52.9)
Assessment of pre-exposure prophylaxis (PrEP) measure		
Have you heard about Pre-exposure Prophylaxis (PrEP)?	391 (84.8)	70 (15.2)
Have you ever used PrEP as a prevention measure?	298 (64.6)	163 (35.4)
*Do you skip doses of your PrEP regimen?	83 (28)	215 (72)
Assessment of Post-exposure Prophylaxis (PEP) Measure		
Have you ever used PEP as a prevention measure?	198 (43)	263 (57)
**Did you complete your PEP regimen?	30 (15)	168 (85)
Assessment of condom use		
Do you use a condom with your sexual partners?	423 (91.8)	38 (8.2)
Have you ever experienced a "condom rupture" during sexual intercourse?	321 (69.6)	140 (30.4)
Do condoms decrease sexual pleasure?	330 (71.6)	131 (28.4)
Assessment of Sexual Practice		
Are you sexually active? (engaged in sexual intercourse at least twice in the last 30 days)	408 (88.5)	53 (11.5)
Do you engage in anal sex?	247 (53.6)	214 (46.4)
Do you have more than one sexual partner?	394 (85.5)	67 (14.5)
Have you ever administered a vaginal product?	139 (30.2)	322 (70)

Notes: *n = 298; **n = 198.

(23%), reporting at the hospital (18.9%), herbal treatment (1.1%), and PEP treatment (1.5%). However, approximately half (55%) of the respondents will do nothing. The respondents also reported that majority (86.1%) of the male partners will report at the hospital after a condom rupture incidence.

Table 3 Product Preferences Among Respondents

Participant Practices and Product Preferences	Frequency (%)
What type of condoms do you prefer? Male condom Female condom	426 (92.4) 35 (7.6)
What do you do when your partner declines condom use? Accept Decline Negotiate	143 (31.0) 273 (59.2) 45 (9.8)
What do you do when you experience a condom rupture incident? Self-medicate Report at the hospital Nothing PEP treatment Herbal treatment	106 (23.0) 87 (18.9) 256 (55.5) 7 (1.5) 5 (1.1)
What does your male partner do when there is a condom rupture incident? Nothing Not bothered Do not know Report at the hospital	38 (8.2) 4 (0.9) 23 (5.0) 397 (86.1)
Preferred microbicide formulation Cream Gels Pessaries Rings Vaginal tablet	82 (17.8) 321 (69.6) 20 (4.3) 3 (0.7) 35 (7.6)
Preferred timing to apply microbicide Just before sexual intercourse Immediately after sexual intercourse Before and after sexual intercourse A timing independent on timing of sexual intercourse	23 (5.0) 42 (9.1) 103 (22.3) 293 (63.6)
Concerns in terms of microbicide use Cost of microbicide Interference with sexual pleasure Male partner acceptance Wetting effect Time of administration Efficacy of microbicide	27 (5.9) 30 (6.5) 189 (41) 205 (44.5) 7 (1.5) 3 (0.7)
Minimum cost you can afford to pay for a microbicide (Naira) 100 - < 200 200 - <500 500 - <1000 >1000	394 (85.5) 56 (12.1) 8 (1.7) 3 (0.65)

In terms of a microbicide product preference, most of the respondents will prefer a microbicide in a gel (69.6%) and cream (17.8%) formulations and “a timing independent of sexual intercourse (63.6%)”. Concerns reported by respondents regarding a microbicide product include male partner acceptance, wetting effects, interference with sexual pleasure,

Table 4 Factors Associated with the Willingness to Use a HIV Microbicide

Factors	Bi-Variate OR (95% CI)	P-Value	Multivariate OR (95% CI)	P Value
Age	0.962 (0.917–1.009)	0.113	0.954 (0.903–1.009)	0.098
Number of sexual partners	1.921 (1.358–2.716)	<0.0001	1.555 (1.035–2.335)	0.034
Use of condoms	16.429 (6.175–43.707)	<0.0001	4.701 (1.418–15.584)	0.011
Condom rupture	5.374 (1.999–14.449)	0.001	2.550 (1.817 –7.959)	0.107
Use of PrEP	1.703 (3.070–37.316)	0.101	0.621 (0.321–1.032)	0.996
Use of PEP	1.211 (1.210 –14. 657)	0.024	0.301 (0.402–4.436)	0.995
Engage in anal sex	0.129 (0.029–0.564)	0.007	0.581 (0.097–3.497)	0.553
Education				
Primary	-	Ref	-	Ref
Secondary	10.00 (2.262–44.203)	0.002	0.719 (0.106–4.882)	0.736
Tertiary	4.888 (1.495 –15.982)	0.009	0.551 (0.115–2.632)	0.455
Non formal	1.607 (0.349–7.391)	0.542	0.391 (0.050–2.882)	0.330

time of administration, efficacy, and cost. Although most respondents indicated an interest in the provision of free microbicides, an evaluation of the minimum cost that they could afford showed that 85.5% were willing to pay a minimum cost of 100–200 naira.

The results of the bivariate and multivariate analyses to determine the factors associated with willingness to use an HIV microbicide are shown in Table 4. After adjusting for all covariates, factors such as the number of sexual partners ([aOR] 1.555; 95% CI 1.035–2.335), use of condoms ([aOR] 4.701; 95% CI 1.418–15.584), and condom rupture experience ([aOR] 2.550; 95% CI 1.817 –7.959) were associated with greater odds of willingness to use an HIV microbicide, whereas other factors such as age, education, engaging in anal sex, the use of PrEP, and use of PEP were not associated with willingness to use a microbicide.

Discussion

Overall, HIV and HIV prevention awareness was high among the study population of female sex workers in Lagos-Nigeria, but there was low awareness of microbicides (below 11%). Sexual risk behaviors that increase potential exposure to HIV were also common in this population, with most respondents reporting more than one sexual partner, engaging in anal sex, having a ruptured condom experience, and not using prophylaxis in the setting of a ruptured condom. Nearly one-third of the participants reported having sex with a partner who refused to use a condom. These high-risk sexual behaviors could predispose to HIV infection among a cohort of women with high awareness of HIV transmission, suggesting a missed opportunity for education, counseling, and implementation of additional HIV prevention measures for this group. The reasons for these risky behaviors will be best explained in a follow-up qualitative study, which will give opportunity for in-depth discussion.

Most of the respondents had never heard of microbicides; however, the pre-study session on what a microbicide represents created the awareness and the vast majority were willing to use them. On the contrary, the findings of Smith and Adeiga,²³ which was a study among a mixed population of truck drivers, journalists, hairdressers, clerks, technicians, and secretaries, revealed that 77.5% of their study population had never heard about microbicides and a low level of willingness among the high-risk group (truck drivers and hairdressers). Okere et al²⁴ reported that 81.5% of their study participants had never heard of microbicides, but in concordance with our study, most (60%) were willing to use a microbicide.

Factors such as the use of condoms, condom rupture experience, and number of sexual partners were found to be associated with the willingness to use a microbicide. This could be attributed to the fact that this cohort of respondents

engaged in high-risk sexual behavior and are willing to explore various HIV preventive measures. Okere et al equally attested to the fact that the past use of a protective measure would influence the willingness to use a microbicide.

The mean age of the respondents in this study (29.63 ± 8.8 years) is in tandem with the age group reported to have a high prevalence of HIV globally and in sub-Saharan Africa. Therefore, it is crucial to consider the opinions and preferences of this group in the development of microbicides. Currently available HIV prevention measures are effective; however, there are challenges associated with their use, such as skipping prescribed medication doses and pill fatigue. Condoms are effective in the prevention of HIV and other sexually transmitted infections. However, the findings of a study on the limitations of its effective use are further discussed. The need for male partner consent, negotiations, possibility of a condom rupture experience, and popular reports of its tendency to decrease sexual pleasure are limiting factors.^{25,26} Furthermore, pre- and post-exposure prophylaxis require adherence to daily dosing for maximal effectiveness. Although some respondents used both measures for HIV prevention, many reported skipping doses or discontinuation of treatment. The challenges of existing HIV prevention approaches and the quest for better options may explain the high level of willingness among female commercial sex workers to use HIV microbicides in the future.

The respondents indicated interest in a microbicidal agent that will be presented as gels and creams compared to other formulations, although they have further expressed concerns for products that will cause a wetting effect or leakage, which is one of the major drawbacks of the conventional microbicides.^{27,28} A microbicidal agent that can avoid this effect will be more acceptable and, consequently, more effective in the long term. Furthermore, a female-controlled microbicide is desirable to the respondents in this study to rule out the need for negotiation before its use. However, respondents expressed concerns regarding the acceptance of male partners.

Male partner acceptance is a factor that cannot be ignored with respect to protective measures that require an agreement between both parties. A study on the use of condoms among Black heterosexual men in Ontario, Canada, showed that less than one-third of the participants and married men had a positive attitude towards condom use.²⁹ Our findings revealed that male condoms are preferable to female condoms. Other studies on the utilization of female condoms among women of reproductive age have shown low uptake even among women.²⁵ A survey on awareness of microbicides among men and their willingness to accept their use is also necessary to complement this study.

The effect of the proposed microbicide on sexual pleasure was a major factor for consideration because 71.6% of the respondents in this study claimed that condoms decreased sexual pleasure. Abdulai et al⁷ in his study among rural women in Ghana reported that 49% of rural participants were concerned about the effects of the microbicides on sexual pleasure. In addition, Randolph et al¹⁸ has provided evidence that many people believe that condoms decrease sexual pleasure, and men, in particular, who have this belief, are less likely to use them. Similarly, in this study, 47.1% of the respondents confirmed having concerns about the effect of future microbicides on decreasing sexual pleasure. Consideration of the factors that have hindered the correct use and acceptability of currently available HIV prevention measures and an intentional effort to develop future HIV-prevention microbicides that will address these concerns will be a major step toward developing a product with high acceptability and efficacy.

Limitations of the Study

The selection of brothels and participants was based on purposive sampling because the brothel operations are not legal in the country, so it was difficult to employ a random sampling method, which is a better method for sampling.

Conclusion

There is a high level of willingness to use a future microbicide among the female commercial sex workers in this study. In addition, majority of the participants will prefer a microbicide product that is female controlled, affordable, and provided as an over-the-counter medication. Currently available HIV prevention methods have challenges, and efforts are still required to develop prevention techniques that address the lacunas of previous tools. These cohorts of women are a key consideration for HIV prevention efforts, and their product preferences and concerns should be considered in microbicide development to enhance the acceptability, adherence, and efficacy of future microbicides.

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Disclosure

The authors report no conflicts of interest in this work.

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