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Condoms, Lubricants and Rectal Cleansing: Practices Associated with Heterosexual Penile-Anal Intercourse Amongst Participants in an HIV Prevention Trial in South Africa, Uganda and Zimbabwe

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Abstract

We investigated condom and lubricant use, rectal cleansing and rectal gel use for penile-anal intercourse (PAI), during in-depth interviews with women from South Africa, Uganda and Zimbabwe who formerly participated in VOICE, a five-arm HIV prevention trial of two antiretroviral tablets and a vaginal gel. Few studies have addressed practices related to PAI among women; existing data from Africa on condom and lubricant use for PAI, as well as preparatory practices of PAI such as rectal cleansing, are limited to men who have sex with men. Women demonstrated a lack of awareness of HIV transmission risks of PAI and none of the participants reported using condom-compatible lubricants for PAI. Participants described a variety of preparatory rectal cleansing practices. Some participants disclosed rectal use of the vaginal study gel. Understanding practices related to PAI in Africa is critical to microbicide development, as these practices are likely to influence the acceptability, feasibility, and use of both vaginal and rectal microbicide products.

Keywords

Condom; Lubricant; Rectal cleansing; Heterosexual; Anal intercourse; HIV

Introduction

While heterosexual penile-anal intercourse (PAI) is not widely reported, there is recognition that its role in HIV transmission to women in sub-Saharan Africa may be underestimated [1, 2]. Moreover, the focus on women contracting HIV through penile-vaginal intercourse (PVI) may obscure risk via PAI. Engaging in heterosexual PAI is associated with participation in other high-risk sexual activities, including having multiple sexual partners, transactional sex, and sex under the influence of drugs or alcohol [3]. Heterosexual men and women are less knowledgeable than men who have sex with men (MSM) about the HIV risks of PAI, and are less likely to use condoms for PAI [2, 4]. The limited evidence that does exist suggests that women, similar to MSM, practice a range of preparatory practices for PAI, but are less likely to use condoms and condom-compatible lubrication for PAI than MSM [5].

As early as 1998, Karim and Ramjee warned that HIV prevention studies should consider the effect that PAI may have in the context of microbicide trials, lest a vaginally-applied microbicide gel be perceived by participants to also be protective during PAI. Heterosexual PAI has the potential to significantly reduce the power of vaginal microbicide effectiveness trials; if participants contract HIV via condomless PAI, researchers' ability to detect any protective effect of a vaginal gel may be undermined if vaginal application does not also protect the rectal compartment [6, 7]. It is assumed that a proportion of HIV infection endpoints in vaginal microbicide trials will result from receptive PAI [8].

The physiological and histological nature of the rectum, with denser concentration of receptor immune cells in the rectal mucosa, combined with a thinner epithelium than the vagina, means that a female receptive partner in PAI is at higher risk than she would be in PVI [9]. For both men and women, receptive PAI with an HIV positive male partner is the sexual behaviour with the highest per act risk of HIV acquisition, estimated to be somewhere between 10 and 20 times more risky than receptive PVI [9, 10]. In addition to higher reported STI rates amongst heterosexual men and women who report PAI, evidence suggests that receptive PAI can also cause reproductive tract infections in women, which increase HIV and STI transmission risks [11]. Additionally, due to factors such as increased rectal viral shedding and degeneration of the single colonic epithelial cell layer facilitated by human semen, the insertive partner in PAI is likely to be at higher risk of contracting HIV in PAI than PVI [11, 12].

Preparatory practices for PAI such as enemas and rectal douching (RD) are also associated with increased HIV and STI risk, as RD damages rectal epithelia, increasing susceptibility to HIV transmission [11, 13–15]. The majority of the data on the association between enemas and RD with HIV transmission have been generated from studies amongst MSM.

Understanding preparatory practices associated with PAI amongst women is crucial in order to design an effective and acceptable microbicide product, whether vaginal or rectal, as they may have an impact on the efficacy and acceptability of such a product [13, 16]. Additionally, in order to develop acceptable, appropriate and effective HIV prevention products for women in Africa, it is critical to understand behavioural factors likely to influence product use. We investigated condom and lubricant use, rectal cleansing and rectal

gel use for PAI, as part of a qualitative study amongst women from South Africa, Uganda and Zimbabwe, who formerly participated in VOICE, an HIV prevention trial of two antiretroviral oral tablets and a vaginal gel.

Methods

VOICE was a multisite phase IIB HIV prevention trial conducted 2009 to 2012, to evaluate the safety and effectiveness of tenofovir-based HIV prevention products: daily 1 % tenofovir vaginal gel and two daily oral tablets (Viread® and Truvada®). 5029 female participants from Zimbabwe (N = 630), Uganda (N = 322) and South Africa (N = 4077) were enrolled. During VOICE, participants self-reported their adherence to study products, as well as their sexual behaviour, using pictorial audio-computer assisted self-interview (ACASI). One ACASI question assessed engagement in PAI in the past 3 months as follows: “In the past 3 months how many times have you had anal sex? By anal sex we mean when a man puts his penis inside your anus”. Across all VOICE sites, 17 % of women reported PAI at baseline; varying between 7 % in Uganda and Zimbabwe to 20 % in South Africa.

VOICE-D was a two-stage multi-site qualitative ancillary study conducted after completion of the VOICE trial (www.mtnstopshiv.org/news/studies/mtn003d). This paper includes data collected 2012–2013 during the first stage of VOICE-D, where we qualitatively explored potentially sensitive behaviours, including adherence to study products, anal sex and related practices amongst former VOICE participants. Ethical approval for VOICE-D was obtained from Institutional Review Boards and Ethics Committees at each of the implementing study sites in Zimbabwe, Uganda and South Africa and collaborating institutions in the United States and in Cape Town.

In-depth interviews (IDIs) were conducted with 88 female participants from four sites in three countries: N = 20 each at two sites in Durban, South Africa; N = 26 from Chitungwiza, Zimbabwe; N = 22 from Kampala, Uganda (data are presented by country; the two sites in Durban were combined for analysis). Participants were preselected for participation to ensure that at least 10 % had reported engaging in PAI while enrolled in VOICE, and approximately 10 % had acquired HIV during VOICE. Those participants who had previously reported PAI in ACASI were not alerted that this was a stratification criterion; interviewers did not know whether participants had reported PAI during VOICE, and interviews were not targeted towards their specific reporting of the behaviour. Interviews were conducted in participants’ language of preference (Zulu, Luganda, Shona or English), followed a semi-structured format, and covered two main topic areas of adherence to study products and anal sex. Interview questions relevant for this paper explored participant perceptions of heterosexual anal sex practice in the community, products that women might use before or during PAI, cleansing practices women might engage in, and own experiences of, or perceptions of other women’s use of study gel for PAI.

Audio recordings of IDIs were transcribed verbatim into their original language, reviewed by the site interviewers, translated into English, and reviewed again. Initial coding began with a preliminary codebook that had been iteratively developed for another ancillary study to VOICE, as previously described [17]. The codebook for VOICE-D was collaboratively

modified for the research topics of interests and as new codes emerged through transcript review. Transcripts were coded using NVivo 10 (QSR International) software by a team of four analysts who communicated frequently to ensure standardization. An example of how a portion of text referring to study gel being used during PAI for its lubricating properties would have been coded: parent code SEX, child code ANAL SEX; combined with parent code STUDY PRODUCT, child code GEL; combined with parent code EFFECT, child code LUBRICATES.

In order to establish inter-coder reliability, >10 % of transcripts were coded in parallel by at least two analysts. Inter-coder reliability reports were automatically generated by the software on specific code combinations, such as parent code SEX, child code ANAL SEX. Discrepancies were resolved until 80 % inter-coder reliability was established and verified. Coded data were then concatenated into reports by thematic area and summarised, and interpretations of the data were critically discussed until there was group consensus.

Results

In this sample of 88 former VOICE participants enrolled into stage 1 of VOICE-D, mean age was 29, 95 % had a primary partner or husband, and 51.1 and 48.9 % were in the study tablets and gel groups, respectively (Table 1). Notably in the Ugandan sample, many of the participants disclosed selling sex, which is likely to account for the substantial difference in mean number of sexual partners, as well as mean number of lifetime partners, between the Ugandan site and the other sites. In addition to demographic characteristics of all study participants, the bottom section of Table 1 presents prevalence of condom use, lubricant use, rectal cleansing and rectal gel use as reported by the subset of 20 VOICE-D participants who reported PAI during the IDIs. Whether women reported their own personal experiences with PAI or not, they were asked about their perceptions and knowledge of PAI and related practices. Direct (translated) quotes from the IDIs provide insight into participant experiences and perceptions regarding practices associated with PAI.

Condom Use for PAI

All participants, regardless of personal disclosure of PAI, were asked if condoms hypothetically might be used for heterosexual PAI. The majority (17/26, 65 %) of Zimbabwean participants and South African participants (29/40, 73 %) believed that condoms would be used for PAI. In Uganda, the majority (13/22, 59 %) of participants, however, did not think it possible to use condoms for anal sex, for a range of reasons including the anus being too tight, too small, dry, narrow, and that the condom would tear or get stuck. Some participants asserted that with the anus already being narrow, a condom would increase the girth of the penis, making penetration more difficult.

It is easier without a condom... because the anus is narrow and he is adding a condom (making the penis thicker)! (Ugandan, age 30)

Condoms Unnecessary for PAI—PAI as ‘Safer Sex’—Some participants believed that it was not necessary to use condoms for PAI, suggesting that some men and women choose to engage in PAI for HIV prevention, as PAI is seen as a safe alternative to PVI.

Indeed, knowledge of anal STIs and HIV transmission via anal sex amongst participants was generally very poor.

Anal sex does not lead to as many illnesses as the vaginal sex. (Ugandan, age 36)

The belief that PAI is ‘safe sex’ and the lack of knowledge about anal STIs reduced the incentive for condom use.

He doesn’t use a condom for that (PAI) because the anus is not the same as the vagina (laughs)... the genitals (penis and vagina) carry diseases but the anus doesn’t. (South African, age 30)

The following quotation suggests that a man’s motivation to engage in PAI may be rooted in a desire to protect himself from HIV acquisition.

If a woman is (HIV) positive and the man is negative, he might want to have anal sex with her so that he won’t get infected... if one person is (HIV) positive and the other is HIV negative, the negative person won’t get infected when having anal sex. (South African, age 23)

Condoms Used for Hygiene—Despite the belief that the anus harbours fewer diseases than the vagina, many of the participants described the anus as ‘dirty’. Women explained that when condoms are used during PAI, they are generally used for cleanliness, to avoid getting faecal matter on the penis, rather than as a method of protecting against HIV and STI transmission.

If he doesn’t use it (condom) he will come out with dirt from the anus. (South African, age 31)

Condoms are used to protect the man from faeces in the rectum. (Zimbabwean, age 31)

Women expressed the concern that if they engaged in condomless PAI, their male partner would be disgusted if his penis were to come into contact with faeces, and also that she herself would feel embarrassed if this were to happen.

Isn’t it that the organ in question (anus) is usually dirty? ...the man would be disgusted by faeces so he will use them (condoms) to protect himself. (Zimbabwean, age 29)

Condom Negotiation in Relationships—Condom use was associated with casual sex partners and mistrust, and women related challenges in negotiating condom use with ‘stable’ partners, irrespective of the type of sexual practice. Condom use was generally described as a female-initiated behaviour; consequently, in situations of forced, non-consensual PAI, condoms were not used.

How is he going to use a condom if he forced me? ...how could we have used it (condom) if we did not even agree to do it (anal sex)? (South African, age 33)

Among the subset (N = 20, 23 %) of VOICE-D participants that disclosed having had personal experiences with PAI during the IDIs, 55 % (N = 11) said that a condom had been

used on one or more occasions. Some of these participants said that they had either experienced condom slippage or breakage during PAI due to the physiology of the anus, being ‘too tight’, ‘not smooth’, ‘too narrow’, ‘hard’, and ‘dry’.

Lubricant Use for PAI

Condom-Incompatible Lubrication—Participants were asked their views on whether women might use any kind of lubricants for PAI. No participants reported use of condom-compatible lubrication. Twelve (60 %) of the twenty participants who reported PAI said that no lubricating substance of any kind had been used. Of the eight participants who reported using some type of lubricating substance for PAI, six reported having used Vaseline™.

Men apply Vaseline on themselves... so that they can be clean... so that it can be fast and slippery. (South African, age 30)

It is possible that the reportedly high rates of condom breakage during PAI cited by participants may be due to the lack of any lubrication, or the use of Vaseline™ (petroleum jelly), which is known to degrade latex.

Because it was painful, he applied Vaseline. I don’t know why he did that but maybe he thought it would soften things... I didn’t feel anything soften, because I didn’t want that to begin with... A condom was used... (he applied Vaseline) on me (to my anus)... he then put it (the condom) on... It happened, but it was painful... we finished the first ‘round’ in the vagina... Then we ‘romanced’ for some time, then he put on the condom and got into the anus. (South African, age 25)

Other products that were cited as being used during anal sex for their lubricating properties included cooking oil, moisturiser, baby oil and semen.

After the vaginal sex, you allow the seminal fluid to flow into the anus and then you can use that (to lubricate). (Ugandan, age 26)

Women also reported using vaginal fluid to lubricate the anus for PAI.

You can get some jelly substance from your vagina that will make it easy for a man’s penis to slide into your anus. (South African, age 33)

Rectal Cleansing Practices

Only 3/20 participants who reported having had PAI said that they had cleaned their anus before hand. Most of the others said that they did not engage in any preparatory cleansing as either the PAI was unexpected or forced. Home-made enemas administered for non-sexual reasons, such as in preparation for child-birth, were described as common. Despite not reporting their own pre-coital rectal cleansing experiences, many of the women described various cleansing methods that they believed other women engage in as preparation for PAI. Participants described simple methods such as wiping the anus with a cloth or rinsing the rectum with warm water. One participant explained that pre-coital cleansing of the anus and rectum is more difficult than pre-coital cleansing of the vagina.

You clean your vagina differently than the way you clean your anus. You can insert your finger inside your vagina if you want to but doing that to the anus is difficult... when you need to use your hand to clean the vagina you can do that... using the hand to clean out the dirt (vaginal fluid). (South African, age 20)

Some women described the use of enemas consisting of cleaning products such as body soap and laundry soap, in preparation for receptive PAI.

(Women) use soap... to help take out all the faeces from the body... definitely everyone who engages in anal sex first administers enemas to release all the dirt (faeces). (Ugandan, age 25)

They are powders... the product for washing (anus in preparation for PAI) is a green solid product... it's green and it can be ground... it looks like sugar. (South African, age 31)

Similar to reasons for reported condom use for PAI, concern for hygiene was described as the primary motivation for rectal cleansing. Women felt that it was important to ensure that the male partner should not come into contact with any faecal matter, thus a woman needs to ensure that her rectum is clean before engaging in receptive PAI.

There are faeces... that place is actually for defecating!...(Women) clean themselves using enemas so that when the man enters he doesn't find faeces there... some use enemas with just water, others use enemas with Sunlight soap (dishwashing soap) to clean themselves. (South African, age 33)

Many VOICE-D participants, perhaps because of their inexperience, or stigmatising attitudes towards PAI, expressed no knowledge about lubricating or RD practices.

Study Gel Use for PAI

Participants were asked if they thought that VOICE participants who had been enrolled into the gel arm of the study would have used the vaginal study gel rectally. Some of the participants believed that if the gel provided protection from HIV in the vagina, there would be no reason why it would not have provided protection in the rectum.

If she (a woman) uses it (gel) for the other job (PVI)... if she can use it in the vagina and it has no problem, she can also use it in the anus. (Ugandan, age 32)

Some participants suggested that women might have used the gel vaginally or rectally, depending on the type of sex her husband demanded.

This (anus) would now be another passage that a husband can use during sex... the husband would want to penetrate here... through the anus, then she has to use (gel) there (anus) because that is where the husband will penetrate... if you had reached an understanding with your husband that he can use the vagina and the anus for purposes of sexual intercourse, then it means that you can use the gel for both vaginal and anal sex. (Zimbabwean, age 33)

Of the participants who disclosed personal experiences with PAI in the IDI, 13/20 had been randomly assigned to the gel arm of the study. Of these gel users, 3/13 (one South African

and two Ugandans) said that they had used the gel rectally, citing reasons such as prevention of HIV transmission.

I applied the gel on the anus... so that I won't be infected with a virus through the anus... it treated me well (I liked it). It made me hot (aroused)... Here on the vagina when I was having vaginal sex and then here at the back... when I have anal sex, I bend as if I am administering an enema... I applied the gel when I was about to sleep with my partner... If he wanted vaginal sex, I applied it there and if he wanted anal sex then I applied it there... he would tell me where he was going to put in his (penis)... if we were only going to have anal sex... I applied it on the anus. (South African, age 25)

Benefits of Rectal Use of Study Gel—A number of the Ugandan participants talked about their fellow participants using the gel rectally. One reason given was the perception that applying the gel rectally gave them 'the desire' for sex by helping to induce the production of vaginal fluid. Others spoke of women using the gel for its lubricating properties, to make anal sex 'easy' and less painful.

(A woman) can use it (the gel rectally)... because the anus is dry, she can smear it there... she smears it in the anus... you can put the gel there and it lubricates the anus to enable the man to insert his penis and she (the woman) does not bleed during that sex (PAI)... so that she does not bleed. (Ugandan, age 27)

(The gel) helped them to make it easy to enter (the anus) without pain... It wouldn't tear...(because) the anus is hard... (women) used to insert it (the study gel)... to help them enjoy... because it (gel) was slippery. (Ugandan, age 34)

Some participants described the belief that if you applied the gel vaginally it would provide protection against HIV transmission for the whole body, thus if you applied the gel vaginally you would be protected during PAI.

I: Do you know of any fellow participant who uses the gel but has anal sex and yet she inserts the gel in the vagina?

R: They are many... I work with some of them (fellow sex workers)

I: Do they say that they insert it in the vagina?

R: Mmmhmm (yes), one says that today, I got one for anal sex. We knew that the medication went to different parts of the body.

I: That if you inserted it in the vagina, it would work in the whole body?

R: ...Yes, because we thought that it worked in the entire body. (Ugandan, age 26)

Another participant believed that if you had inserted the study gel vaginally, and started a coital encounter with vaginal sex, then the gel remaining on the penis would be protective.

It (gel) can be used (for anal sex) especially in our case were we started with vaginal sex. So the gel would still be on the man's thing (penis). (Zimbabwean, age 24)

One participant described how the vaginal study gel applicator made it easy to insert the gel rectally.

Because of the way it had a pump she could use it to apply it... in the anus is where she inserts the pump and applies the gel... because of the fact that you are going to have anal sex she only applies in the anus and not in the vagina... Because of the way it (the gel) was slippery... for the anus to be slippery so that those who were having anal sex would apply it (to anus) instead of applying it in the vagina. (Ugandan, age 25)

Many of the participants were of the view that women would not have used the gel rectally, because they were only instructed to use it vaginally. Some participants suggested that one reason the gel would not have been used rectally was due to the belief that PAI is a form of 'safe sex', which people engage into avoid contracting HIV and STIs, and thus no gel would be necessary to prevent HIV transmission.

Discussion

This paper describes practices relating to PAI based on indepth interviews with 88 women in South Africa, Uganda and Zimbabwe, who had participated in the VOICE trial. The findings suggest that women in these communities lack awareness of the HIV and STI transmission risks of PAI, experience condom failure in PAI, do not use condomcompatible lubricants, and practice rectal cleansing, sometimes using substances that increase HIV transmission risks. Additionally, we uncovered that some participants enrolled in the gel arm of the clinical trial were using the vaginal study gel rectally.

Based on the accounts from VOICE-D participants, as well as other study findings, condomless PAI is sometimes practiced as a form of 'safe sex' [11, 18–20], due to a lack of information about the HIV and STI transmission risks of PAI. Study participants described condom use for PAI being primarily for hygiene, to avoid penile contact with faecal matter, rather than for protection against HIV and STI infection. Similar findings emerged from a study of heterosexual American women [21], and another amongst heterosexual adolescents in England [19]. Additionally, for heterosexual men and women in many parts of the world, condoms are synonymous with contraception and vaginal sex; with the risk of pregnancy removed in PAI, the motivation for condom use decreases [2, 11]. Evidence suggests that PAI is also used as a means of contraception by women in Africa and elsewhere [18, 22]. Similar to findings described in another study [22], condom use amongst VOICE-D participants was associated with casual sex partners and mistrust, therefore women related experiencing challenges in negotiating condom use with 'stable' partners, irrespective of the type of sexual practice. Five VOICE-D participants also reported that condoms were not used when they experienced forced PAI. Evidence from other studies suggests that women who sell sex are also more likely to experience coerced condom non-use for PAI, and frequent condom breakage [23, 24].

Concern has been expressed that the latex condoms that are provided free of charge by government bodies are manufactured and tested for the purposes of PVI, and that they are more likely to fail when used for PAI [25]. Incorrect use of condoms, combined with use of

latex-incompatible lubricants mean that condom failure occurs more often during PAI than PVI, further reducing motivation for condom use [11]. Many of the VOICE-D participants who disclosed having had PAI said that they experienced condom breakage and slippage during PAI, blaming it on the physiology of the anus.

VOICE-D participants cited various products that are used to lubricate PAI among heterosexuals, including Vaseline™, cooking oil, baby oil, semen and vaginal fluid. None of the VOICE-D participants cited the use of purposefully manufactured latex condom-compatible sexual lubricants for PAI. These findings concur with other evidence showing that the most widely reported lubricants used for any form of sex by both men and women in Africa are petroleum jelly-based products such as Vaseline™, known to degrade latex and cause condom breakage [4, 26]. In comparison to petroleum jellies, which are readily available, cheap, and can be purchased easily in both urban and rural areas of Africa, water-based sexual lubricants are expensive, with limited availability [26]. There are still gaps in evidence relating to the safety of lubricants, but it is likely that petroleum-based products cause irritation to the delicate epithelium of the rectum, reducing tissue integrity and facilitating HIV transmission [9, 11, 26, 27]. One study demonstrated an association between lubricant use for PAI and rectal STIs, but was unable to explain causation [27]. Existing data on lubricating practices for PAI in the African context mostly pertains to MSM, who are likely to be more knowledgeable than women regarding lubricant use, due to targeted MSM HIV prevention activities. The use of lubricating products by both men and women may have implications for both vaginal and rectal microbicide efficacy, and needs to be further examined.

VOICE-D participants described the use of enemas comprising soap and water by women in preparation for PAI. Rectal douching with soap-based products, the most commonly used substances, causes damage to the rectal epithelia, thereby increasing susceptibility to HIV transmission [13, 15]. The literature suggests that enemas are a common cultural practice throughout sub-Saharan Africa, used for ritual cleansing, but disassociated from sexual practice [28]. The re-use of enema equipment by traditional healers has been cited as a risk factor for HIV transmission [29]. Rectal tissue damage caused by regular enema use, combined with engaging in PAI, may be a contributory factor for HIV transmission in sub-Saharan Africa.

In terms of the feasibility and acceptability of a rectal microbicide product, that pre-coital rectal cleansing appears to be common suggests that a rectal microbicide delivered by means of a RD may be acceptable among women [13]. Researchers are trying to develop a rectal cleansing product that also includes a microbicidal agent [13]. Pre-coital douching would achieve wide coverage of the rectal mucosa with a protective agent prior to intercourse, which may be a more acceptable form of delivery than current gel formulations of microbicides requiring a large volume of gel to be present in the rectum during penetrative intercourse [13, 15]. A microbicidal enema could enhance adherence to pre-exposure prophylaxis as it would fit in with existing sexual practices, for both MSM and women [30].

Additionally, because some women in Africa already use some form of lubricating product for PAI, and evidenced by the reported rectal application of the vaginal study gel by some

VOICE-D participants, a rectal microbicide lubricating gel could be an acceptable and feasible product for HIV prevention through PAI [5]. Consistent with the literature, VOICE-D participants suggested that PAI usually takes places after PVI, in the same coital encounter. It has been suggested that because of this concurrence, a microbicide gel that would be used both vaginally and rectally could be greatly acceptable and have a significant impact on HIV transmission to women [27, 31]. A single combination gel may provide better protection against HIV transmission than existing single entity gels, and at the same time broaden the potential target population which could benefit from such a product [31]. Due to differences between the vaginal and rectal compartments' physiology, morphology and function, developing a microbicide product safe and effective for use on both compartments has been challenging. When used rectally, the hyperosmolar properties of the current vaginal gel cause damage to the fragile rectal epithelia, and can produce unpleasant gastrointestinal side effects [9, 13]. An innovative dual-chamber vaginal/rectal microbicide gel has recently been successfully developed but is yet to be tested in a clinical trial [32]. A Phase 1 study, MTN-014, is currently underway investigating a tenofovir-based gel for use in both the rectal and vaginal compartments in women in the United States (for more information go to <http://www.mtnstopshiv.org/studies/4585>).

Limitations

Social desirability bias may have influenced participants' responses, particularly in the case of a behaviour as socially stigmatised as PAI. VOICE-D participants may not have been candid in disclosing their own personal experiences of PAI and related practices. Moreover, the findings in this paper only reflect female participants' perspectives on the use of condoms, lubricants, RD and rectal use of the study gel; for a more balanced view it would be important to interview male partners. It is increasingly recognized that the success and acceptability of microbicides may hinge on male partners' support and endorsement, particularly as male partners may be involved in product application. In addition, the views expressed in these findings reflect those of the 88 women interviewed, and may not be representative of women in their communities. Another limitation of the current study is that there was no specific discussion of how use of oral HIV prophylaxis tablets (PrEP) was perceived in relation to PAI and HIV risk; this is another area requiring further research.

Conclusions

To the best of our knowledge, this study is the first to describe condom use, lubricant use and rectal cleansing practices related to heterosexual PAI in Africa. Further research is needed to understand practices relating to PAI, and the implications that these have for HIV transmission. Additionally we need to better understand the circumstances surrounding PAI practice, particularly if it tends to be an anticipated activity or not, as this will affect microbicide use. Despite the current focus on MSM in rectal microbicide trials in Africa, there is a need to include women in such trials, and to shed light on the socio-cultural factors that influence condom, lubricating and cleansing practices related to heterosexual PAI. The findings from VOICE-D can inform current HIV prevention priorities aimed at women in sub-Saharan Africa, as well as future education and biomedical interventions to address HIV transmission through PAI.

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References

1. Karim SS, Ramjee G. American Public Health Association. Anal sex and HIV transmission in women. *Am J Public Health*. 1998; 88(8):1265–1266. [PubMed: 9702169]
2. Halperin DT. Heterosexual anal intercourse: prevalence, cultural factors, and HIV infection and other health risks, Part I. *AIDS Patient Care STDs*. 1999; 13(12):717–730. [PubMed: 10743535]
3. Kalichman SC, Simbayi LC, Cain D, Jooste S. Heterosexual anal intercourse among community and clinical settings in Cape Town, South Africa. *Sex Transm Infect*. 2009; 85(6):411–415. [PubMed: 19429569]
4. Priddy FH, Wakasiaka S, Hoang TD, Smith DJ, Farah B, del Rio C, et al. Anal sex, vaginal practices, and HIV incidence in female sex workers in urban Kenya: implications for the development of intravaginal HIV prevention methods. *AIDS Res Hum Retrovir*. 2011; 27(10):1067–1072. [PubMed: 21406032]
5. Exner TM, Correale J, Carballo-Díezguez A, Salomon L, Morrow KM, Dolezal C, et al. Women's anal sex practices: Implications for formulation and promotion of a rectal microbicide. *AIDS Educ Prevent*. 2008; 20(2):148–159.
6. McGowan I, Taylor DJ. Heterosexual anal intercourse has the potential to cause a significant loss of power in vaginal microbicide effectiveness studies. *Sex Transm Dis*. 2010; 37(6):361–364. [PubMed: 20514687]
7. Mensch BS, Hewett PC, Abbott S, Rankin J, Littlefield S, Ahmed K, et al. Assessing the reporting of adherence and sexual activity in a simulated microbicide trial in South Africa: an interview mode experiment using a placebo gel. *AIDS Behav*. 2010; 15(2):407–421. [PubMed: 20886278]
8. Mâsse BR, Boily M-C, Dimitrov D, Desai K. Efficacy dilution in randomized placebo-controlled vaginal microbicide trials. *Emerg Themes Epidemiol*. 2009; 6(1):5. [PubMed: 19818138]
9. McGowan, I. Doctoral thesis. Liverpool: University of Liverpool; 2013. The Clinical Development of Rectal Microbicides for HIV Prevention.
10. Baggaley RF, White RG, Boily MC. HIV transmission risk through anal intercourse: systematic review, meta-analysis and implications for HIV prevention. *Int J Epidemiol*. 2010; 39(4):1048–1063. [PubMed: 20406794]
11. McBride KR, Fortenberry JD. Heterosexual anal sexuality and anal sex behaviors: a review. *J Sex Res*. 2010; 47(2–3):123–136. [PubMed: 20358456]
12. Varghese B, Maher JE, Peterman TA, Branson BM, Steketee RW. Reducing the risk of sexual HIV transmission: quantifying the per-act risk for HIV on the basis of choice of partner, sex act, condom use. *Sex Transm Dis*. 2002; 29(1):38–43. [PubMed: 11773877]
13. Carballo-Díezguez A, Bauermeister JA, Ventuneac A, Dolezal C, Balan I, Remien RH. The use of rectal douches among HIV-uninfected and infected men who have unprotected receptive anal intercourse: implications for rectal microbicides. *AIDS Behav*. 2008; 12(6):860–866. [PubMed: 17705033]
14. Fuchs EJ, Lee LA, Torbensson MS, Parsons TL, Bakshi RP, Guidos AM, et al. Hyperosmolar sexual lubricant causes epithelial damage in the distal colon: potential implication for HIV transmission. *J Infect Dis*. 2007; 195(5):703–710. [PubMed: 17262713]
15. Javanbakht M, Stahlman S, Pickett J, LeBlanc M-A, Gorbach PM. Prevalence and types of rectal douches used for anal intercourse: results from an international survey. *BMC Infect Dis*. 2014; 14(1):95. [PubMed: 24555695]

16. Koblin BA, Mayer K, Mwatha A, Brown-Peterside P, Holt R, Marmor M, et al. Douching practices among women at high risk of HIV infection in the United States: implications for microbicide testing and use. *Sex Transm Dis*. 2002; 29(7):406–410. [PubMed: 12170130]
17. van der Straten A, Stadler J, Montgomery E, Hartmann M, Magazi B, et al. Women's experiences with oral and vaginal preexposure prophylaxis: the VOICE-C qualitative study in Johannesburg, South Africa. *PLoS ONE*. 2014; 9(2):e89118. [PubMed: 24586534]
18. Duby Z, Colvin C. Conceptualizations of heterosexual anal sex and HIV risk in five east African communities. *J Sex Res*. 2014; 51(8):863–873. [PubMed: 24611445]
19. Marston C, Lewis R. Anal heterosex among young people and implications for health promotion: a qualitative study in the UK. *BMJ Open*. 2014; 4(8):e004996.
20. Stadler JJ, Delany S, Mntambo M. Sexual coercion and sexual desire: Ambivalent meanings of heterosexual anal sex in Soweto. South Africa. *AIDS Care*. 2007; 19(10):1189–1193. [PubMed: 18071961]
21. Maynard E, Carballo-Diéguez A, Ventuneac A, Exner T, Mayer K. Women's experiences with anal sex: motivations and implications for STD prevention. *Perspect Sex Reprod Health*. 2009; 41(3):142–149. [PubMed: 19740231]
22. Houston AM, Fang J, Husman C, Peralta L. More than just vaginal intercourse: anal intercourse and condom use patterns in the context of "main" and 'casual' sexual relationships among urban minority adolescent females. *J Pediatr Adolesc Gynecol*. 2007; 20(5):299–304. [PubMed: 17868897]
23. Alexander M, Mainkar M, Deshpande S, Chidrawar S, Sane S, Mehendale S. Heterosexual anal sex among female sex workers in high HIV prevalence states of India: need for comprehensive intervention. *PLoS ONE*. 2014; 9(2):e88858. [PubMed: 24586416]
24. Decker MR, Pearson E, Illangasekare SL, Clark E, Sherman SG. Violence against women in sex work and HIV risk implications differ qualitatively by perpetrator. *BMC Public Health*. 2013; 13(1):1. [PubMed: 23280303]
25. Silverman BG, Gross TP. Use and effectiveness of condoms during anal intercourse: a review. *Sex Transm Dis*. 1997; 24(1):11–17. [PubMed: 9018778]
26. Geibel S. Condoms and condiments: compatibility and safety of personal lubricants and their use in Africa. *J Int AIDS Soc*. 2013; 16:18531. [PubMed: 23841994]
27. Gorbach PM, Weiss RE, Fuchs E, Jeffries RA, Hezerah M, Brown S, et al. The slippery slope: lubricant use and rectal sexually transmitted infections: a newly identified risk. *Sex Transm Dis*. 2012; 39(1):59. [PubMed: 22183849]
28. Saethre EJ, Stadler J. Gelling medical knowledge: innovative pharmaceuticals, experience, and perceptions of efficacy. *Anthropol Med*. 2010; 17(1):99–111. [PubMed: 20419520]
29. Peltzer K, Mngqundaniso N, Petros G. A controlled study of an HIV/AIDS/STI/TB intervention with traditional healers in Kwa-Zulu-Natal. South Africa. *AIDS Behav*. 2006; 10(6):683–690. [PubMed: 16715347]
30. Leyva FJ, Bakshi RP, Fuchs EJ, Li L, Caffo BS, Goldsmith AJ, et al. Isoosmolar enemas demonstrate preferential gastrointestinal distribution, safety, and acceptability compared with hyperosmolar and hypoosmolar enemas as a potential delivery vehicle for rectal microbicides. *AIDS Res Hum Retrovir*. 2013; 29(11):1487–1495. [PubMed: 23885722]
31. Dezzutti CS, Shetler C, Mahalingam A, Ugaonkar SR, Gwozdz G, Buckheit KW, et al. Safety and efficacy of tenofovir/IQP-0528 combination gels: a dual compartment microbicide for HIV-1 prevention. *Antivir Res*. 2012; 96(2):221–225. [PubMed: 22940075]
32. Ham A, Lustig W, Nugent S, Peters J, Katz D, Shelter C, et al. Formulation development of the DuoGel: a dual chamber vaginal/rectal anti-HIV microbicide gel. American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition. 2013 Abstr. R6132.

Table 1

Demographic characteristics of VOICE D sample, sexual behaviour, and practices associated with PAI

	All countries N = 88	South Africa N = 40	Uganda N = 22	Zimbabwe N = 26
Demographic characteristics				
Mean age (range)	28.6 (20–40)	26 (20–40)	29.5 (20–39)	28.6 (22–40)
HIV sero-positive	10 (11.4 %)	4 (10 %)	3 (13.6 %)	3 (11.5 %)
Enrolled in tablet arm of VOICE	45 (51.1 %)	20 (50 %)	11 (50 %)	14 (53.8 %)
Enrolled in gel arm of VOICE	43 (48.9 %)	20 (50 %)	11 (50 %)	12 (46.2 %)
Relationship/sexual partners				
Currently married	35 (40 %)	–	13 (59 %)	22 (85 %)
Has current primary sex partner or married	84 (95 %)	38 (95 %)	22 (100 %)	24 (92 %)
Mean number of sexual partners in lifetime (range) ^a	9.9 (1–99)	3.3 (1–15)	31.2 (2–99)	2.1 (1–10)
Among those with current primary sex partner or married				
Vaginal sex in past 3 months with primary sex partner	83 (98 %)	37 (97 %)	22 (100 %)	24 (100 %)
Mean number of other partners in last 3 months (range) ^a	4.1 (0–99)	0.1 (0–1)	16 (0–99)	0 (0–1)
Among those who reported PAI in VOICE-D IDI	N = 20 (23 %)	N = 11 (13 %)	N = 6 (27 %)	N = 3 (3 %)
Condom used for PAI	11 (55 %)	8	2	1
Any lubrication used for PAI	8 (40 %)	7	1	0
Vaseline used for PAI	6 (30 %)	6	0	0
No lubrication used for PAI	12 (60 %)	4	5	3
Cleaned anus before PAI	2 (10 %)	0	0	2
Among those who reported PAI in VOICE-D IDI in Gel arm	N = 13	N = 7	N = 2	N = 3
Reported using gel rectally for PAI	3	1	2	0

^aValues of “99” mean “99 or more sexual partners” to subscript