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Intravaginal practices among HIV-negative female sex workers along the US–Mexico border and their implications for emerging HIV prevention interventions

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Abstract

Objective—To describe intravaginal practices (IVPs) among female sex workers (FSWs) who inject drugs in two cities—Tijuana and Ciudad Juarez—on the border between the USA and Mexico.

Methods—Data for a secondary analysis were obtained from interviews conducted as part of a randomized controlled trial in FSWs who injected drugs between October 28, 2008, and May 31, 2010. Eligible individuals were aged at least 18 years and reported sharing injection equipment and having unprotected sex with clients in the previous month. Descriptive statistics were used to assess frequency and type of IVPs. Logistic regression was used to assess correlates of IVPs.

Results—Among 529 FSWs who completed both surveys, 229 (43.3%) had performed IVPs in the previous 6 months. Factors independently associated with IVPs were reporting any sexually transmitted infection in the previous 6 months (adjusted odds ratio [aOR] 1.8, 95% confidence interval [CI] 1.1–3.1; $P=0.03$), three or more pregnancies (aOR 1.9, 95% CI 1.1–3.2; $P=0.02$), and

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Conflict of interest

The authors have no conflicts of interest.

having clients who became violent when proposing condom use (aOR 5.8, 95% CI 1.0–34.3; $P=0.05$), which are all factors related to inconsistent condom use.

Conclusion—Screening for IVPs could help to identify FSW at increased risk of HIV, and facilitate conversations about specific risk-reduction methods.

Keywords

Douching; Female sex workers; HIV risk; Intravaginal practices

1. Introduction

In the era of pre-exposure prophylaxis (PrEP) for HIV prevention and anticipated expansion of the ways that PrEP can be administered, new attention is being paid to women's intravaginal practices (IVPs) [1]. IVPs include insertion of liquid, suppositories, or other material into the vagina for any reason. The microbial and immunological environment of the female genital tract is complex and influenced by a range of factors including IVPs, all of which can influence HIV susceptibility and efficacy of PrEP [2].

The association between increased HIV susceptibility and IVPs is plausible but inconsistent in epidemiologic studies [3–5]. In addition to confounders including condom use, frequency and type of sexual exposure, and co-infections, there is significant diversity in IVPs that could affect HIV risk. One study [5] found that washing with noncommercial preparations was associated with an increased HIV prevalence, whereas washing with commercial preparations was associated with a lower prevalence. A recent meta-analysis [4] found that intravaginal washing with soap increased risk of HIV acquisition by 24%, and use of intravaginal cloth or paper increased the risk by 47%. Furthermore, intravaginal soap use has been associated with bacterial vaginosis, which has been shown to increase risk of HIV acquisition [4,6]. Complicating the picture, bacterial vaginosis could be a mediator in HIV susceptibility among women who wash intravaginally; in one study [7], HIV prevalence was not increased among women who performed IVPs but did not have bacterial vaginosis.

Whether or not IVPs directly increases HIV susceptibility, these practices must be understood to compliment research on vaginal PrEP. As an individually controlled, discrete protection method, PrEP offers new hope in the HIV prevention community, especially for women. However, vaginal PrEP trials among women have shown conflicting results [8,9]. Mixed findings from these studies underscore the need to understand women's practices, preferences, and the environment in which prevention methods are introduced to achieve reductions in HIV infections.

IVPs vary by social, demographic, and political factors. Associations with culture, economic status, number of sexual partners, contraception, and intimate partner violence have been described [10–15]. It is particularly important to understand IVPs among women at high risk of HIV acquisition, both to counsel them on potential risks and to consider potential interactions with HIV prevention methods.

Female sex workers (FSWs) have 13 times the odds of having HIV when compared with other women of reproductive age in low- and middle-income countries, and an overall HIV prevalence in these nations of 11.8% [16]. FSWs are therefore an important population for HIV prevention methods such as PrEP, and a group in whom understanding IVPs is essential. IVPs among FSWs have been described in Africa, Asia, and the Caribbean [1,17,18]. However, to our knowledge, no published studies have addressed IVPs among FSWs in North, Central, or South America. The aim of the present study was to describe IVPs among FSWs who inject drugs and live along the border between the USA and Mexico, among whom the HIV prevalence is 12% [19]. The prevalence of, and correlates for using IVPs, and women's motivations for using IVPs were characterized. It was hypothesized that women reporting IVPs would have a profile consistent with an increased risk of HIV acquisition, and that women would report using IVPs as a risk-reducing strategy. Study results will provide guidance for HIV prevention strategies in this high-risk population.

2. Materials and methods

Data for the present cross-sectional analysis were obtained as part of a four-arm factorial randomized controlled trial testing the efficacy of two behavioral interventions to increase condom use and promote safe injection practices among FSWs who inject drugs in Tijuana and Ciudad Juarez on Mexico's northern border. The methods of the trial have been reported previously [20]. Briefly, between October 28, 2008, and May 31, 2010, 626 FSWs who injected drugs were invited to participate. HIV-negative individuals aged at least 18 years who reported sharing injection equipment and having unprotected sex with clients in the previous month were eligible for inclusion. The review boards at the University of California San Diego, Universidad Autonoma de Ciudad Juarez, and El Colegio de la Frontera Norte approved the protocol. All participants provided written informed consent.

Participants agreed to participate in interviewer-administered surveys and to testing for sexually transmitted infections (STIs) every 4 months during the study. Baseline surveys obtained information on demographics, sexual and drug-use behaviors, reproductive health histories, and sex-work characteristics. Participants also completed a supplemental interview that included questions on IVP at a follow-up visit 1 month later. Only individuals who completed both surveys were included in the present analysis. To assess for selection bias, characteristics of women who completed only the baseline questionnaire were compared with those of women who completed both surveys using χ^2 or Fisher exact tests for categorical variables, and Mann-Whitney U tests for continuous variables.

Descriptive statistics were used to assess the overall distribution of women who performed IVPs, and to describe types of IVP used by interview location. Participants were then divided into those who reported any type or frequency of IVPs in the previous 6 months and those who did not. Depending on variable type and distributional assumptions, χ^2 , Fisher exact, or Mann-Whitney U tests of independence were used to compare demographic and sexual health variables between women who performed IVP in the past 6 months and those who did not. Univariate logistic regression was used to assess correlates of IVP, including demographics (interview location, age, education, and income), reproductive health

characteristics (previous pregnancies and abortions, condom use, other contraception use, and previous STIs), and other risk factors for HIV (violence or rape history). Factors achieving significance levels of 0.10 or less were considered for a multivariate model. The model was assessed for multi-collinearity by examining the largest condition index and variance inflation factors. Factors reaching significance levels of 0.05 or less were considered statistically significant. Analyses were performed using Stata version 13.1 (StataCorp, College Station, TX, USA).

3. Results

Overall, 584 women completed baseline surveys, 529 (90.6%) of whom also completed supplemental surveys. Participants who completed both surveys did not differ significantly from those who completed only baseline surveys with respect to interview location, age, age at first sex work, marital status, parity, history of induced abortion, condom use during anal sex, reported STIs and diagnosis of STIs at baseline, accessing of reproductive health services, daily alcohol or drug use, or history of rape (data not shown). However, women who completed both surveys were more likely to speak English, to have used no contraception other than condoms in the previous 6 months, to have used condoms at least some of the time during vaginal sex in the previous month, and to report ever being physically abused ($P<0.05$ for all; data not shown).

Among the 529 FSWs who completed both surveys, 293 (55.4%) had ever performed IVPs, and 229 (43.3%) had done so in the previous 6 months. Performance of IVPs in the previous 6 months was significantly higher in Ciudad Juarez than in Tijuana ($P<0.001$) (Table 1). Similarly, use of homemade solutions—water, vinegar, baking soda, herbs, lemon, tea, alcohol, soap, and other “disinfectants”—during IVPs in the previous 6 months was reported by more women in Ciudad Juarez ($P<0.001$).

More women in Tijuana than in Ciudad Juarez reported IVP during menses ($P<0.001$), before/after sex ($P<0.001$), for a partner/healthcare worker ($P=0.03$), or to tighten her vagina ($P=0.006$) (Table 1). Women who reported performing IVPs for their partners or healthcare providers did not specify whether IVPs had been requested or whether women independently decided to perform IVPs. By contrast, performance of IVPs to prevent infection was reported by significantly more women in Ciudad Juarez than in Tijuana ($P=0.002$) (Table 1). There were no differences in the proportion of women who reported IVP to treat vaginal symptoms, to clean, or for no reason (Table 1).

Generally, women who performed IVPs had more risk factors for HIV acquisition (Table 2). Women who reported three or more pregnancies, any STI in the previous 6 months (although STIs diagnosed at baseline were not predictive), more clients in the previous month (specifically more non-regular clients), and experiencing violence from a client when proposing condom use were more likely to perform IVPs (all $P<0.05$). Women who reported ever having an induced abortion, ever having syphilis, using condoms inconsistently during vaginal sex in the past month, experiencing anger from a client when proposing condom use in the past month, or ever being physically abused were marginally more likely to perform IVPs (all $P=0.05$ – 0.10). There was no difference in IVP use between women who accessed

reproductive healthcare services in the previous year and those who did not (47/229 [20.5%] vs 53/298 [17.8%]; $P=0.4$).

Multivariate logistic regression revealed that reporting any STI in the previous 6 months, three or more pregnancies, and having a client who became violent when proposing condoms were independently associated with IVPs in the previous 6 months (all $P \leq 0.05$) (Table 3). There was a marginally significant association between previous induced abortion and IVPs, although this was not statistically significant (Table 3).

4. Discussion

In the present cross-sectional study of FSWs on the US–Mexico border, 43.3% of participants had performed IVPs in the previous 6 months, with types of practices and reasons for performing IVPs varying by region. IVPs were independently associated with factors related to inconsistent condom use [21]: women who had any reported STI in the previous 6 months, three or more pregnancies, a history of induced abortion, or a history of violence when proposing condoms were more likely to report IVPs.

Although a marginally significant association was found between IVPs and inconsistent condom use in univariate analyses ($P=0.10$), this association did not retain significance in multivariate analyses. If, according to our hypothesis, FSWs who performed IVPs had risk factors associated with increased vulnerability to HIV, these individuals should be expected to use condoms less frequently. The lack of statistical significance could reflect the cross-sectional nature of the study: FSWs' condom use in the previous month could be different from condom use in the past during previous pregnancies and infections. This study limitation could also explain why performing IVPs was associated with history of STIs, but not baseline STI diagnoses.

The reasons why FSWs with more HIV risk factors could be more likely to perform IVPs cannot specifically be determined. However, the associations with violence when proposing condom use and induced abortion offer a potential mechanism: these women could have less autonomy in the management of their reproductive health, and could use IVPs to reduce risk in lieu of more partner-dependent prevention methods. A study of IVPs among FSWs in China [22] found an association with decreased condom use and potential use of IVPs to decrease risk. In the present study, almost 30% of FSWs in Ciudad Juarez and approximately one-tenth in Tijuana reported using IVPs to prevent infection. Whether women used IVPs in place of—or in addition to—effective prevention tools, this finding suggests the importance of developing various discrete, woman-controlled methods to prevent infection.

Two-thirds of women in Ciudad Juarez and more than half of women in Tijuana reported using IVPs to treat vaginal symptoms that could be suggestive of infection. It is unclear whether these participants presented to a healthcare provider in addition to, or in place of, attempting self-treatment with IVPs, perhaps partly explaining the association between IVPs and self-reported previous STIs but not baseline STI diagnosis. Interestingly, there was no difference between women who performed IVPs and those who did not with respect to

accessing reproductive health services. However, the present study did not capture the quality of these health services, or the trust that individuals had in their health providers to discuss their sexual and vaginal practices in detail. In a survey of gynecologists in California, USA, only 15.4% of providers asked all patients about IVPs [23]. Although provider practices vary by region, it is likely that patients were not screened for IVPs at their reproductive health visits.

The present analysis showed use of IVPs to prevent and treat symptoms was more frequent in Ciudad Juarez than in Tijuana. Previous studies of IVPs have also found that practices vary by region [11]. Motivations behind these practices require further investigation, including whether women use IVPs in place of, or in addition to, accessing reproductive healthcare services. In light of the evidence associating homemade solutions for IVP with increased HIV prevalence [5], it is particularly alarming that almost 80% of FSWs who performed IVPs in Ciudad Juarez and approximately 30% of those in Tijuana used a homemade product. Although the reasons for geographic differences cannot be elucidated in the present study, the variation suggests possible differences in healthcare knowledge or access. These findings deserve further study, including assessment of accessibility and quality of reproductive health services in each city, and could result in community-specific interventions including education on health effects of IVPs.

Because the present investigation was a secondary data analysis, the results might not be generalizable to all FSWs in these cities, especially because the original trial intentionally recruited women at high risk of HIV/STIs. Although analyses showed that women who completed both surveys were similar to those who completed only the baseline interview, selection bias could still have been present. Additionally, results are limited to interview data about women's IVPs; reasons for performing IVPs and types of IVPs might be more comprehensively explored in a qualitative study. Furthermore, all information regarding IVPs and HIV risk factors were based on self-report, which could be subject to socially desirable reporting.

Causal inferences regarding IVPs and HIV susceptibility might be drawn in a future study using HIV incidence as an endpoint in a different study population. With the inclusion of FSWs who inject drugs, it would be impossible to isolate new HIV infections due to sexual intercourse versus needle-sharing, and therefore causality could not be assessed. Nevertheless, the present study suggests not only that providers should discuss IVP with patients, but also that IVPs could be a marker for other characteristics that predispose women to HIV and other STIs. Specifically, IVPs could be a marker for characteristics associated with inconsistent condom use, and identification could facilitate discussion of other infectious risk factors. Furthermore, determining women who perform IVPs could identify potential PrEP candidates, although vaginal PrEP could be suboptimal because of potential IVP-PrEP interactions.

A previous study in the same population of FSWs on the US-Mexico border [24] found that 89% of participants were highly interested in vaginal PrEP. Although oral PrEP in women has been shown to decrease risk of HIV acquisition when taken consistently, studies of PrEP in the form of vaginal gels have shown inconsistent efficacy to date [8,25]. It has yet to be

determined if vaginal gels have been unsuccessful at reducing HIV acquisition because of poor adherence, biological factors, or potentially confounding by other practices such as IVPs [26]. Two studies of PrEP in the form of vaginal rings, The Ring Study and ASPIRE, are anticipated to provide results in 2016 [25]. What is clear, as demonstrated by previous PrEP trials and by the present study, is that talking with women about IVPs is an important part of evaluating an individual's HIV risk profile and strategies for HIV prevention. Discussion of IVPs could facilitate conversations about a range of HIV prevention practices between patients and providers, including specific approaches that high-risk women could use to reduce their risk of infection.

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Synopsis

Screening for intravaginal practices is important when evaluating women's HIV risk and could facilitate conversations about methods for risk reduction.

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Table 1Frequency, types, and reasons for performing IVPs.^a

IVPs	All participants	Ciudad Juarez	Tijuana	<i>P</i> value ^b
Any IVPs in the previous 6 months	229/529 (43.3)	146/274 (53.3)	83/255 (32.5)	<0.001
Frequency				
IVP performed less than monthly	99/229 (43.2)	78/146 (53.4)	21/83 (25.3)	<0.001
IVP performed monthly	88/229 (38.4)	48/146 (32.9)	40/83 (48.2)	0.02
IVP performed weekly or more	42/229 (18.3)	20/146 (13.7)	22/83 (26.5)	0.02
Use of a homemade solution	140/229 (61.1)	115/146 (78.8)	25/83 (30.1)	<0.001
Reasons for performing IVP ^c				
During menses	82/229 (35.8)	40/146 (27.4)	42/83 (50.6)	<0.001
Before/after sex	27/229 (11.8)	7/146 (4.8)	20/83 (24.1)	<0.001
For someone else (partner, healthcare provider)	8/229 (3.5)	2/146 (1.4)	6/83 (7.2)	0.03
To clean	149/229 (65.1)	96/146 (65.8)	53/83 (63.9)	0.7
To prevent infection	50/229 (21.8)	41/146 (28.1)	9/83 (10.8)	0.002
To treat vaginal symptoms	146/229 (63.8)	99/146 (67.8)	47/83 (56.6)	0.09
To tighten vagina	5/229 (2.2)	0/146	5/83 (6.0)	0.006
No reason	3/229 (1.3)	1/146 (0.7)	2/83 (2.4)	0.3

Abbreviation: IVP, intravaginal practice.

^aValues are given as number/total number (percentage) unless indicated otherwise.^bComparison between locations.^cParticipants could report multiple reasons for performing IVP.

Table 2Factors associated with IVPs in the previous 6 months.^a

Factors	IVPs (n=229) ^a	No IVPs (n=300) ^a	Univariate odds ratio (95% CI)	P value ^b
Demographics				
Tijuana	83 (36.2)	172 (57.3)	0.42 (0.30–0.60)	<0.01
Ciudad Juarez	146 (63.8)	128 (42.7)	2.36 (1.66–3.37)	<0.01
Age, y	34 (29–40)	32 (27–46)	1.01 (0.99–1.03)	0.11
Age at first sex work, y	19 (15–25)	18 (15–23)	1.01 (0.99–1.04)	0.43
Have spouse/steady partner	82 (36.2)	119 (39.7)	0.87 (0.61–1.23)	0.42
>6 y education	112/217 (51.6)	139/285 (48.8)	1.12 (0.79–1.60)	0.53
Income >3500 pesos/month	119 (52.0)	136 (45.3)	1.29 (0.92–1.83)	0.15
Spoke any English	69 (30.1)	82 (27.3)	1.15 (0.78–1.68)	0.48
Reproductive health				
3 pregnancies	169 (73.8)	171 (57.0)	1.54 (1.09–2.19)	0.02
1 induced abortion	25/214 (11.7)	19/279 (6.8)	1.82 (0.97–3.40)	0.06
Use of any contraception other than condoms in previous 6 months	87/228 (38.2)	108 (36.0)	1.10 (0.77–1.57)	0.61
Any self-reported STI in previous 6 months	78 (34.1)	68 (22.7)	1.76 (2.20–2.59)	<0.01
Infections at baseline				
Any	165 (72.1)	217 (72.3)	0.99 (0.67–1.45)	0.94
Chlamydia	29/212 (13.7)	34/274 (12.4)	1.12 (0.66–1.90)	0.68
Gonorrhea	5/208 (2.4)	7/269 (2.6)	0.92 (0.29–2.95)	0.89
Syphilis ^c	67/227 (29.5)	69/297 (23.2)	1.38 (0.94–2.05)	0.10
Trichomonas	73 (31.8)	109 (36.3)	0.82 (0.57–1.18)	0.29
Bacterial vaginosis	99 (43.2)	112 (37.3)	1.28 (0.90–1.82)	0.17
Ever physically abused	126/227 (55.5)	139/295 (47.1)	1.40 (0.99–1.98)	0.06
Ever raped	123/228 (53.9)	142/295 (48.1)	1.26 (0.89–1.78)	0.19
Had a gynecologic exam in past year	47 (20.5)	53/298 (17.8)	1.16 (0.62–2.16)	0.65
Sex work characteristics				
No. clients in previous month	48 (16–90)	20 (8–68)	1.01 (1.00–1.01)	<0.01
Regular clients	4 (3–10)	4 (2–10)	1.01 (0.99–1.02)	0.64
Non-regular clients	30 (10–82)	15 (5–48)	1.01 (1.00–1.01)	<0.01
Always used condoms for vaginal sex in past month	1/167 (0.6)	6/174 (3.4)	0.16 (0.02–1.37)	0.10
Always used condoms for anal sex in past month	7/64 (10.9)	5/64 (7.8)	1.47 (0.44–4.91)	0.52
Any client anger at proposed condom use in past month	24/198 (12.1)	18/253 (7.1)	1.81 (0.95–3.43)	0.07
Any client violence at proposed condom use in past month	13/200 (6.5)	3/250 (1.2)	5.87 (1.65–20.9)	0.01

Abbreviations: IVP, intravaginal practice; CI, confidence interval; STI, sexually transmitted infection.

^aValues are given as number (percentage), median (interquartile range), or number/total number for whom data available (percentage), unless indicated otherwise.^bAssociated with the odds ratio.^cDiagnosed with a positive syphilis titer and confirmatory testing; diagnosis included primary, secondary, tertiary, or treated syphilis.

Table 3

Factors independently associated with intravaginal practices in the previous 6 months.

Factor	Adjusted odds ratio (95% confidence interval)	P value
3 pregnancies	1.9 (1.1–3.2)	0.02
History of induced abortion	2.4 (0.9–6.8)	0.09
Any reported sexually transmitted infection in previous 6 months	1.8 (1.1–3.1)	0.03
Any client violence at proposed condom use in previous month	5.8 (1.0–34.3)	0.05