



CLINICAL ARTICLE

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 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.

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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 non-commercial 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 increase HIV susceptibility, these practices must be understood to complement research on vaginal PrEP. As an individually controlled, discrete protection method, PrEP offers new hope in the HIV prevention community, especially for women.

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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).

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