ELSEVIER

Why Do Women Douche? A Longitudinal Study with Two Analytic Approaches

REBECCA M. BROTMAN, PHD, MPH, MARK A. KLEBANOFF, MD, MPH, TONJA NANSEL, PHD, JUN ZHANG, MD, PHD, JANE R. SCHWEBKE, MD, KAI F. YU, PHD, JONATHAN M. ZENILMAN, MD, AND WILLIAM W. ANDREWS, MD, PHD

PURPOSE: Although vaginal douching is associated with several adverse outcomes, the reasons why women douche have not been studied prospectively.
METHODS: Non-pregnant ($N = 3620$) women aged 15 to 44 years presenting for routine care at 12 clinics in Birmingham, Alabama, participated in a longitudinal study of vaginal flora (1999–2003). Participants were assessed quarterly for 1 year. The authors applied conditional logistic regression in a case-crossover analysis to determine the individual-level factors that vary between a woman's douching and non-douching intervals. Findings were compared to a population-level analysis utilizing generalized estimating equations.
RESULTS: Thirty percent of participants douched in every interval; 28% douched in some but not all intervals. The case-crossover analysis indicated a woman was more likely to douche when reporting "fishy" vaginal odor (odds ratio [OR]:2.74; 95% confidence interval [CI]: 1.55, 1.84), vaginal irritation (OR: 1.52; 95% CI: 1.10, 2.11), summer month (OR: 1.37, 95% CI: 1.13, 1.67), or increase in number of sex partners (≥3, OR: 2.42, 95% CI: 1.11, 5.26). Bacterial vaginosis/trichomoniasis treatment (OR: 0.72, 95% CL: 0.59, 0.89) and absent menses (OR: 0.37, 95% CI: 0.28, 0.50) were negatively associated with douching. These ORs were farther from the null than comparable population-level estimates.
CONCLUSIONS: Programs targeting these predictors may decrease the untoward sequelae associated with douching. Furthermore, a case-crossover analysis applied to prospective studies can provide insights into time-varying factors.
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KEY WORDS: Vaginal Douching, Vaginosis, Bacterial.

INTRODUCTION

Vaginal douching, the practice of intravaginal cleansing with a liquid solution, is a commonly practiced feminine hygiene behavior. Approximately 22% of reproductive-aged women in the United States report using vaginal douches; among non-Hispanic black women, the prevalence rate is over two-fold higher (50%) (1, 2). Limited data are available on the risks associated with vaginal douching (3). In both prospective and cross-sectional studies, the practice has been associated with an elevated risk of bacterial vaginosis (BV) (4–6), changes in vaginal ecology (7, 8), cervical infection (9–12), pelvic inflammatory disease (13–15), cervical cancer (16), and acquisition of human immunodeficiency virus (17, 18). Commercial douche products consist primarily of fragrance, acetic acid, water and surfactant detergents. Detergents can disrupt cell membranes, causing irritation to mucosal surfaces that can increase the susceptibility to genital tract infections (19).

Although douching is commonly practiced, the reasons why women douche have not been clearly delineated and previous studies have been cross sectional (20–27). To our knowledge, there have been no longitudinal studies of feminine hygiene practices. The purpose of this study was to prospectively identify patterns of vaginal douching and predictors of douching practice. This information is necessary for developing douching cessation and prevention interventions.

METHODS

Patient Selection

Study participants were enrolled in the Longitudinal Study of Vaginal Flora (LSVF) which has been described

Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health (R.M.B.), the Division of Infectious Diseases, Johns Hopkins University School of Medicine, (J.M.Z.), Baltimore; the Division of Epidemiology, Statistics and Prevention Research, National Institute of Child Health and Human Development, Department of Health and Human Services, Rockville, MD (R.M.B., M.A.K., T.N., J.Z., K.F.Y.) and the University of Alabama at Birmingham (J.R.S., W.W.A.).

Address correspondence to: Rebecca Brotman, PhD, MPH, Johns Hopkins Bayview Medical Center. 4940 Eastern Ave., Infectious Diseases Division, B-3 North, Baltimore, MD 21224. Tel: (410) 550-9079; fax: (410) 550-1169. E-mail: rbrotman@jhsph.edu.

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360 Park Avenue South, New York, NY 10010

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Selected Abbreviations and Acronyms

BV = bacterial vaginosis
LSVF = Longitudinal Study of Vaginal Flora
CLR = conditional logistic regression
OR = odds ratio
GEE = generalized estimating equations
DMPA = depomedroxyprogesterone

previously (28). Briefly, non-pregnant women, 15–44 years of age, were recruited between August 1999 and February 2002 when presenting for routine health care at one of 12 clinics in the Birmingham, Alabama area. Participants were assessed at a baseline visit and at four quarterly follow-up visits for up to 1 year of observation. Women presenting with significant medical or gynecological conditions (such as immunocompromised status, postmenopause, posthysterectomy, postpelvic radiotherapy) or receiving antibiotics on a long-term basis (daily for at least 30 days) were ineligible. Other exclusions included conditions hindering informed consent or plans to move from the area in the next 12 months. The protocol was approved by the Institutional Review Boards of the Jefferson County Department of Health, the University of Alabama at Birmingham, and the National Institute of Child Health and Human Development. All participating women provided written informed consent.

Interview

The feminine hygiene questionnaire was developed following four qualitative focus groups addressing attitudes and beliefs about hygiene practices conducted with 31 women in Birmingham, Alabama (29). In the resulting standardized 60-minute interview, administered by trained female staff at each center, participants reported on their demographic characteristics, lifestyle, feminine hygiene practices, sexual risk behaviors, and vaginal symptoms. Time-varying factors were ascertained at each study visit and pertained to the 6 months before the baseline visit and the 3 months preceding each follow-up visit.

A douche product was described to participants as "a fluid to flush out your vagina." Questions on type of products used and motivations for douching, with multiple selections possible, were directed and recorded categorically. At every study visit, participants were asked about the frequency with which they used douche products. Among women who reported douching at the baseline visit, 92% reported douching weekly or less than once a week and 8% reported douching several times per week. Therefore the outcome of interest was defined as any douche product versus no douche product used in the preceding study interval.

Participants underwent a standardized pelvic examination and assessment of clinical symptoms at each visit. Vaginal samples were collected and laboratory methods for detection of organisms were conducted as previously described (28).

Statistical Analysis

Model A: Case-Crossover Analysis. First, we utilized a case-crossover analysis, applying a conditional logistic regression (CLR) model to the prospective observations, in order to compare each participant between her douching and non-douching intervals. Because each woman serves as her own control, the confounding effects of demographics and time-independent factors are eliminated. Only participants who are discordant on outcome (30), that is, reporting douching during at least one but not all intervals, contribute to the analysis (Model A, $n = 1{,}025$, approximately one third of participants, 4,473 intervals). The longitudinal CLR accounts for within-subject correlations and allows us to determine individual-level time-varying factors associated with douching among women who do not habitually use douche products. These 1025 women represent a population that may be most amenable to a douching cessation intervention.

Model B: Cohort Analysis. We then utilized generalized estimating equations (GEE) to model the population-level factors associated with vaginal douching among all women enrolled in the LSVF (Model B, $n = 3{,}620$, 13,589 intervals). In contrast to the case-crossover analysis, the population-level model uses both within- and between-person contrasts (31), and it contributes demographic information which is not time-varying, therefore not represented in the case-crossover analysis.

Model C: Restricted Sample Cohort Analysis. A second population-level GEE model was restricted to the 1,025 women who were eligible for inclusion in the case-crossover analysis—the women with both douching and non-douching intervals—to illustrate to what extent estimates derived from the case-crossover analysis were artifacts of the restricted population as opposed to the differences between models (Model C, 4,473 intervals).

Interpretation of the Models. The odds ratios (ORs) reported in the case-crossover analysis represent when an individual woman had a change in that factor between her douching and non-douching intervals. For example, if the factor of more than three sex partners is associated with douching, the OR for the case-crossover analysis means that a woman is more likely to douche in the interval when she reported three sex partners versus when she reported zero partners. In contrast, the interpretation of the population-level model is that women with three or more sex partners are more likely to douche than women with no sex partners. This difference in interpretation