

Original Investigation

Effect of vaginal douching on vaginal flora and genital infection

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ABSTRACT

Objective: This study aimed to examine the effect of vaginal douching (VD) which is a traditional and cultural application on the vaginal flora and genital infection

Material and Methods: This descriptive study included 190 women including those who did or did not perform VD. A questionnaire survey and vaginal sampling were employed. The collected samples were transported within 8 h for laboratory testing.

Results: There was no significant difference between the two groups in terms of vaginal flora. In the VD group, only a few reported a history of sexually transmitted disease (STD), but none in the non-VD group had STD ($p < 0.05$). No significant difference in infection was noted. However, there was a significant relationship between the infection history and VD application ($p < 0.01$).

Conclusion: Women who apply VD are at the risk of vaginal infections. Further studies are warranted in the future for clinical application.

Keywords: Vaginal douche, Vaginal flora, Infection

Introduction

Vaginal douching (VD) is the process of washing the vagina with water or other liquid solutions (1,2). VD can be widely seen in cultures that define female body, menstruation and sexual relation as dirtiness. In Turkish culture, women define menstruation as dirtiness (3). In Turkey, the rate of VD was 43.9–64.5% (2,4-8, 9). In a 2014 study by the Republic of Turkey Ministry of Health Department, 79.20% of the women were found to be douching for hygiene (96.26%), religious belief (52.86%) and pregnancy prevention (12.74%) (10). These women stated that douching helped them feel clean, healthy and good, treated infections, ablution, enhanced their appeal to partners and prevented pregnancy. Moreover, women performed VD for vaginal cleaning following coitus to protect themselves from diseases and during menstruation, feeling clean before sexual intercourse and gynecological examination, decreasing of unpleasant odours, to imitate others who performed VD, to gain experience, or out of curiosity (2,4-6,8,9,11-14). Various researchers have evaluated the effects of VD on the health of women. While some studies emphasise that VD causes important health issues, others reveal no such correlation. Some studies have indicated the effect of VD on vaginal flora and on the ascension of microorganisms into the upper genital tract (15,16). In the past, VD was associated with bacterial vaginosis, human immunodeficiency virus (HIV) and chlamydial infections, pelvic inflammatory disease (PID), preterm birth, low-birth-weight infants, infertility, ectopic pregnancy, cervical cancer and AIDS (14,18,19). Vaginal dryness, burning in the vaginal area, genitourinary infection and irritation have been reported in women who douche frequently (18). In a past study, the rates of genital infections were 53.5% and 33.8% in women who douched and who did not douche, respectively (19). In 1990, Brinton et al. found that the risk of cervical cancer and PID has increased with the use of commercial products instead of water and soap solution during douching (20). In 2006, Akin et al. detected the rate of VD in women with the history of infertility (40.0%), miscarriage (47.3%), preterm birth (40.0%) and low-birth-weight infant (57.1%) ($p > 0.05$) (6). These results indicate the variation in the reported findings on VD. Martino and Vermund emphasised that VD is harmful (16). The World Health Organization has also indicated the adverse effects of VD in 2012. In a study done by Sunay, Kaya and Ergun, women who douched demonstrated an increased risk of abnormal vaginal discharge (about 3.9 times more; $p = 0.001$) than women who did not douche (22).

Some studies support the positive effect of douching on health. For instance, some findings reported the alleviating effect of VD on HIV and human papilloma virus. In fact, antiseptic douche solutions have been

shown to decrease the incidence of HIV (23,24). In a study on the effect of douching on vaginal flora, douching with saline or acetic acid once daily was found to reduce the structure and number of vaginal bacteria within 10 min. Moreover, douching with povidone-iodine-like bactericidal agents reportedly induced over-reproduction of pathogenic organisms that repress *Lactobacillus* (25,26). Hence, this study aimed to detect the effect of VD on vaginal flora and genital infection in women aged >18 years.

Material and Methods

This study was conducted at the Ministry of Health Hospital and the Maternal and Infant Health Centre of Family Planning. Study subjects included women who had consulted to these centres. The sample size was calculated using the NCSS Pass 2008 program, which required 190 women. Sen and Mete reported a VD frequency of 47.2% (2). The ratio of VD was predicted to be 27.2%–67.2% using the values of 95% confidence interval (CI), 80% power and 20% standard deviation. On the basis of their douching behaviour, subjects were divided into two study groups: douching and non-douching groups. Since the effects of douching on vaginal flora proceeded for 3 days, the VD group consisted of women who had douched in the last 3 days.

Sample selection criteria were age ≥ 18 years; not pregnant; no delivery date in the first 42 days; non-diabetic; not in their menstrual cycle during the study period; not using immunosuppressive drugs, antibiotic, antifungal, antiviral, corticosteroid or chemotherapy in the past 2 weeks and no sexual intercourse in the past 3 days.

A questionnaire developed by the researchers using the literature was used for data collection. Written informed consent was obtained from the subjects before data collection. After application of the questionnaire, vaginal samples were collected by the researcher in a private room. Vaginal samples were taken from the posterior wall of the vagina and lateral fornix, without contacting the vulva using a sterile and disposable cotton swab.

A single-blind study was conducted for the cultivation and examination of vaginal samples by a microbiologist. The samples were transported in the Stuart Transport Medium to the laboratory of XXX University Health Research and the Application Center Microbiology Laboratory within 8 hour of sample collection. Before analysis, the samples were stored at room temperature (transport medium is stable at room temperature). Direct examination and cultivation were performed under laboratory conditions.

The SPSS 15.0 program was used for the statistical analysis of the study data. Study data were evaluated using chi-square and logistic regression tests. A p value < 0.05 was considered statistically significant.

The presence of vaginal infection pathogens and women's health-related factors were considered dependent variables. Factors including age, educational background, working condition, health insurance and the level of income were the independent variables.

Results

The rate of douching is much higher in women aged ≥ 50 years (61.1%). All women in the non-VD group belonged to the 20–29 age group (57.4%), and they were all secondary school graduates. The educational level was higher for women in the non-VD group (76.6%). Among the employed women, 61.1% reported douching, whereas 56.8% of unemployed women reported douching. The income range of douching women was 120–320 USD (~ 600–1600 Turkish Liras (TL)) (59.6%) and < 120 USD (~ < 600 TL) (59.3%), whereas that of women in the non-VD group was ≥ 500 USD (~ ≥ 2500 TL) (80.0%) and 320–500 USD (~ 1601–2500 TL) (61.2%).

Of the total, 41.1% women reported having heard about VD from their social group, 37.9% decided to douche by themselves and 9.5% learnt it from their mothers. The frequency of douching was 3–4 times/week by 35.8% and 1–2 times/week by 33.7% of the women. The frequency of douching was the highest after sexual intercourse in 69.5% of women.

Most women apply VD for personal hygiene. The reasons for douching were reported to be personal hygiene by 83.2%, religious reasons by 26.3%, protection from diseases by 9.5%, family planning by 5.3% and ignorance by 2.1%. Moreover, 75.8% of women douched with water, whereas 17.9% douched with soap.

A statistically significant difference was found as per vaginal infection history ($p < 0.01$) between the two groups. In the VD group, 2.1% of women had STD previously, whereas no women in the non-VD group had STD. Hepatitis B was reported in two women. Previous incidence of vaginal infection was 57.9% in VD subjects and 37.9% in non-VD subjects. A statistically significant difference was found between women with vaginal infection and performing VD ($p < 0.01$). In women with vaginal infection, the reason for infection was unknown in 78.7% in the VD group and 63.9% in the non-VD group.

Table 1 here

No statistically significant difference was found between the two groups with respect to vaginal flora ($p > 0.05$). Microbiological evaluation results of vaginal flora revealed that the rate of women with normal vaginal flora (the primary colonising bacteria of a healthy individual is *Lactobacillus*) was 57.9% in the VD group and 70.5% in the non-VD group ($p > 0.05$) (Table 1).

According to the result of logistic regression, a statistically significant difference was determined among the working condition, profession, education level and income status of women ($p < 0.01$) (Table 2). The probability of VD was found to be higher in house wives and workers in comparison to that in employed women and officers (OR = 2.064, 95% CI: 1.136–3.753; OR = 4.185, 95% CI: 1.520–11.521, respectively). When the education levels were similarly investigated, the probability of VD was found to be much higher in women who

had graduated or not from primary school (OR = 4.052, 95% CI: 1.669–9.837) and who had graduated from secondary school (OR = 5.564, 95% CI: 1.981–15.623) and high school (OR = 4.792, 95% CI: 2.092–10.976) in comparison to that in university graduates. Women with low income were likely to douche more often than women with high income (OR = 5.895, 95% CI: 1.829–19.003).

Table 2 here

In the logistic regression analysis (reference, douching; risk factor, non-douching), the incidence of genital infection was higher in the VD group than in the non-VD group (OR = 2.253, 95% CI: 1.260–4.029).

Discussions

In the VD group, 59.4% of women had primary school and lower education and 63.0% had graduated from secondary school. The education level in the non-VD group was determined to be high school in 44.7% and higher education in 76.6% of women ($p < 0.01$); these findings are supported by other studies (2,4,7,16,19). On the basis of these results, a reverse correlation exists between the education level and VD frequency. Among the employed women, 61.1% did not report VD, whereas 56.8% of the unemployed women reported performing douching ($p < 0.05$). In studies performed by Karaer et al. and Ege et al., employed women were less likely to perform VD (5,19). Another study, Yanikkerem and Yasayan, reported that 81.9% of the women who make VD are housewives(11). The similarity between this study and other studies was revealed in terms of the working condition of the women. A relationship was reported between VD and the socioeconomic levels of women. In the present study, the incidence of VD was higher in women with low income ($p < 0.01$). Karaer et al. also reported a statistically significant relationship between the level of income and VD, as in our study ($p < 0.01$) (5). On the contrary, Sunay et al. found that the frequency of VD habit was higher in married and low-income women (22).

Women had learnt VD from their social groups (41.1%), by themselves (37.9%), through their mothers (9.5%), through healthcare personal (9.5%) and through media (2.1%). Thus, the sources of learning VD were elders, media, mothers, family members, their friends, healthcare personnel and relatives (2,4,6-8,11,12,14,27). A study done by Rosenberg, Phillips and Holmes showed that douching has a strong cultural component (28). The frequency of VD was 35.8% for 3–4 days/week and 33.7% for 1–2 days/week. Overall, the frequency of VD ranges between 1 and 2 times per day and between 1 and 2 times per week/month (4,6-8,9,11,13,29). The factors affecting the frequency of VD were determined as their cause, practice time, belief and cultural response. It was believed that the high incidence of VD was related to avoiding infection from the toilette, menstruation and sexual intercourse.

Most women used water (75.8%) and a solution of soapy water (17.9%) during VD. Various materials were identified for douching, with water and second most commonly used product - water with soap (4,7,8,9,11,19). Similar studies performed in other countries revealed that water containing vinegar and commercial solutions were used more frequently for VD (1,13). With respect to the need for maintaining personal hygiene, it may be thought that VD was performed using only water or a solution of soapy water after taking a bath and using toilette without the use of other solutions. Moreover, the incidence of VD was higher among women with low socioeconomic status. Therefore, the reason for using a solution of soapy water was considered related to their low costs.

The effects of these VD solutions on the vaginal flora remain unknown. In 2004, Zhang et al. identified the incidence of bacterial vaginosis in women using water with vinegar for VD (30). In 1992, Onderdonk et al. found that povidone-iodine caused significant reduction in the normal flora (lactobacilli, the dominant bacteria in the vagina) and an increase in incidence of vaginal infections (25). In 2000, Pavlova and Tao reported that the inhibitory effect of solutions containing vinegar on pathogens cause vaginal infections, except on *Lactobacillus* (31). When the effects of solutions used for VD were investigated, the rate of using a water and soap solution was 14.5% in women with a normal vaginal flora and 22.5% in women with vaginal infection in the VD group. Moreover, 80% of the women with a normal vaginal flora used water and 70% of women with vaginal infection also used water.

In this study, the frequency of using water and soap solution was higher in women with vaginal infection than in women with normal vaginal flora. The rate of using water alone by women with normal vaginal flora was higher than that by women with vaginal infection. According to these results, the rate of using water alone for douching was lesser than that of using water and soap solution. Royen et al. determined that women with bacterial vaginosis used greater amounts of soap for hygiene purposes (32). However, it remains unknown whether the use of soap was causing any change in the vaginal flora and the reason for frequent bathing may be the presence of a fishy odour in the vaginal discharge.

In this study, 57.9% of women in the VD group had an infection history, whereas 62.1% of women in the non-VD group did not have any infection history ($p < 0.01$). Similar results were obtained by other studies; for instance, the rate of vaginal infection was higher in the VD group than that in the non-VD group (4,6,7,9,11,19). Although these findings support that VD may be a risk factor for vaginal infections, the frequency of VD was 1–2 days/week in 40% of the women with vaginal infection compared with 3–4 days/week in those with normal vaginal flora. Women evaluated in terms of the rate of VD did not have any effect on the change in flora.

The incidence of having normal vaginal flora was 57.9% in the VD group and 70.5% in the non-VD group ($p > 0.05$) (Table 1). When the reasons for douching and factors affecting these reasons were evaluated, profession, education and income levels were statistically significant ($p < 0.01$). The probability of VD was higher in housewives and unemployed women than that in employed women and officers (OR = 2.064, 95% CI: 1.136–3.753; OR = 4.185, 95% CI: 1.520–11.521, respectively). Similarly, when the education levels were investigated, the probability of VD was much higher in women who graduated or not from primary school (OR = 4.052, 95% CI: 1.669–9.837) and those who graduated from secondary school (OR = 5.564, 95% CI: 1.981–15.623) and high school (OR = 4.792, 95% CI: 2.092–10.976) than those in graduates. Women with low income were likely to douche more frequently than women with high income (Table 2). Sen and Mete and Arslantas et al. reported that the education level was statistically significant when VD-related parameters were evaluated by logistic regression analysis ($p < 0.009$ and $p = 0.00$, respectively) (2,8). The former found that the probability of VD was higher among illiterate women than in educated ones (OR = 1.760, 95% CI: 1.154–2.683). On the contrary, the latter found that the probability of VD was lower in women with a college or university degree (OR = 0.02, 95% CI: 0.005–0.09). According to Arslantas et al., a statistically significant relationship was evident between VD and working condition ($p = 0.004$), and the probability of VD was lower among employed women (OR = 0.34, 95% CI: 0.16–0.70) (8). The findings of our study, which are similar to those of Sen and Mete and Arslantas et al., imply that the probability of VD was reduced as a result of increasing education level and working outside of the home (2,8).

In the present study, logistic regression analysis was performed to determine the effect of VD on genital infection history. The incidence of genital infection was higher in the VD group than that in the non-VD group (OR = 2.253, 95% CI: 1.260–4.029). Therefore, VD may predispose women to vaginal infection. Sunay et al. reported that the risk of vaginal discharge was 3.9 times higher in the VD group than that in the non-VD group ($p = 0.001$; OR = 3.86, 95% CI = 0.651–1.534) (22). Consequently, there was no statistically significant difference in terms of infection as a result of microbiological evaluation of vaginal samples. However, a statistically significant relationship was determined between infection history and VD ($p < 0.01$). Therefore, we believe that women who apply VD are at the risk of vaginal infections. Further studies are recommended to understand this issue better.

Limitations of the study: Some of the participating women who applied to the study centres complied with the sample exclusion criteria.

Ethical Aspect of the Study

Ethical permissions were obtained from the Governorship of X city; XXX University, Health Research and Application Center, Microbiology Laboratory; XX Medical Faculty, Clinical Research Ethical Committee. Before applying questionnaire, written consent was taken from the women by giving information about the study. The expenses of the laboratory and stationery equipment were met by the financial support of XX University, Coordination Office of Scientific Research Projects.

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Tables

Table 1. Distribution according to microbiological examinations of female vaginal specimens (infection effect-normal flora presence) according to vaginal douching (VD) situations (*n* = 190)

	Practicing VD		Not Practising VD		Total Number		χ^2	<i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Vaginal microbiological examination								
There are vaginal infection factors	40	42.1	28	29.5	68	35.8	3.298	0.069
There is normal vaginal flora	55	57.9	67	70.5	122	64.2		

Table 2. Investigation of some variables affecting women's vaginal douching behaviours by logistic regression.

Variables	β	OR (odds ratio)	95% Confidence interval (CI)	<i>p</i>
Employment status				
Employed		1		
Not employed	0.725	2.064	1.136–3.753	0.017
Profession				
Officer		1		
Worker	1.431	4.185	1.520–11.521	0.006
Education Status				
University		1		
High school	1.567	4.792	2.092–10.976	0.000
Secondary school	1.716	5.564	1.981–15.623	0.001
Primary school and lower education	1.399	4.052	1.669–9.837	0.002
Income*				
>500		1		
320–500	2.168	2.533	0.735–8.730	0.141
120–320	8.824	5.895	1.829–19.003	0.003
<120	6.656	5.818	1.527–22.172	0.010

*Income in United States Dollar.