Relationship between vaginal douching and bacterial vaginosis, sexually transmitted diseases and HIV infection: a systematic review

Relação entre ducha vaginal e vaginose bacteriana, doenças sexualmente transmissíveis e infecção por HIV: uma revisão sistemática

Rose Luce Amaral[1], Ana Katherine Gonçalves[2], Hugo Marcus Rodrigues[2], Paulo Henrique Lima[2], Tardelli Lapaz Prudêncio[2], Nathale Santiago[2], José Eleutério Júnior [3], Paulo César Giraldo[1]

ABSTRACT

Introduction: Despite of vaginal douching has been strongly condemned by most of health care professionals; this practice remains a very common habit among women for several reasons. **Objective**: To assess if there is any association between vaginal douching and bacterial vaginoses, STD and HIV **Methods:** We conducted a systematic review and metanalysis to evaluate the relationship between vaginal douching and bacterial vaginosis, sexually transmitted diseases and HIV infection. The following databases were searched using Mesh terms: PubMed, Embase, Scielo and Google Scholar. Selection criteria: (1) prospective cohort studies of women using vaginal douching; (2) women 12 years or older and (3) studies published from 2000 to October 2011. Studies involving pregnant women were excluded. Methodological quality was assessed using Newcastle-Ottawa scale. Data collection and analysis: Review Manager 5.1 was used for statistical analysis. **Results**: Seven studies (2 STD, 3 Bacterial Vaginosis and 2 HIV) were included based on the chosen criteria: 9.796 women were enrolled. The global Risk Ratios for Bacterial Vaginosis, STD and HIV acquisition were, 1.24 (95%CI 1.12–1.43), 1.12 (95%CI 0.94–1.32), and 1.36 (95%CI 0.92–2.01) respectively. **Conclusion:** There are few studies checking the association between vaginal douching and STD, BV and HIV infection. A weak positive correlation was found between vaginal douching and bacterial vaginosis, but not to STD and HIV infection.

Keywords: vaginal douching, women, STD, bacterial vaginosis, HIV infection.

RESUMO

Introdução: Apesar de ducha vaginal estar fortemente condenada pela maioria dos profissionais de saúde; esta prática continua a ser um hábito muito comum entre as mulheres, por diversas razões. **Objetivo**: Avaliar se há relação entre a prática de duchas vaginais e vaginose bacteriana, DST e HIV. **Métodos**: Foi realizada uma revisão sistemática e meta-análise para avaliar a relação entre a ducha vaginal e vaginose bacteriana, doenças sexualmente transmissíveis e infecção pelo HIV. Os seguintes bancos de dados foram pesquisados utilizando descritores: PubMed, Embase, Scielo e Google Scholar. Os critérios de seleção: (1) estudos prospectivos de mulheres que usam ducha vaginal; (2) mulheres com 12 anos ou mais e (3) estudos publicados de 2000 a outubro de 2011. Estudos envolvendo mulheres grávidas foram excluídos. A qualidade metodológica foi avaliada usando a escala de Newcastle-Ottawa. Coleta de dados e análise: Review Manager 5.1 foi utilizado para análise estatística. **Resultados**: Sete estudos (2 STD, 3 vaginose bacteriana e 2 HIV) foram incluídos com base nos critérios escolhidos: 9,796 mulheres foram incluídos. A razão de risco global para a vaginose bacteriana, DST e aquisição do HIV foram, (IC95% 1,12-1,43) 1,24 (IC95% 0,94-1,32) 1,12 e (IC95% 0,92-2,01) 1,36, respectivamente. **Conclusão**: Há poucos estudos para verificar a associação entre a ducha vaginal e STD, VB e infecção pelo HIV. Foi encontrada uma correlação positiva entre a ducha vaginal e vaginose bacteriana, mas não para DST e infecção pelo HIV.

Palavras-chave: ducha vaginal, mulheres, DST, vaginose bacteriana, infecção pelo HIV.

INTRODUCTION

Vaginal micro flora (VMF) is the most efficient natural barrier against genital infections. The literature has recently accepted the fact that several factors can influence VMF, allowing science to see the delicate balance of this ecosystem as a result of several variables in a woman's life. These factors include age, pregnancy, menstrual cycle phase, sexual activity, vaginal practices and even diet[1-5]. One of the most important factor which leads to abnormal VMF is vaginal douching[6].

It is known that abnormal VMF raises the risk of acquisition of HIV and other sexually transmitted diseases (STD)[6-14] such as *Chlamydia trachomatis*[10,11] and *Herpes simplex*[12]. Additionally, it is also found to favor pelvic inflammatory disease[13], ectopic pregnancy[14], preterm delivery, Bacterial Vaginosis (BV)[6,7,9] and to increase infertility rates[13-15].

Vaginal douching (VD) is wide spread around the world, and is more common than it is to be expected[15]. VD is defined as the practice of cleaning not only the vulvar introitus, but the entire the vaginal cavity, with a liquid solution for perceived hygienic, therapeutic and/or religious purposes[1,16-18]. VD can also be defined as wiping the internal genitalia with fingers and other substances (cotton, cloth, paper) such to remove fluids. This includes douching, which is the pressurized shooting or pumping of water or any other solution (including douching gel) into the vaginal cavity[19].

The medical community frowns on VD, considered a homemade, self-prescribed household remedy. The majority of women disregards these admonitions, and continues douching regardless. The different reasons listed in recent studies include cleanliness after menses and before or after sexual intercourse, alleviating vaginal symptoms, as well as avoiding pregnancy, genital infections and HIV[17,19,20].

[1]Universidade Estadual de Campinas – Campinas (SP), Brasil.
[2]Universidade Federal do Rio Grande do Norte – Natal (RN), Brasil.
[3]Universidade Federal do Ceará – Fortaleza (CE), Brasil.

The douching frequency is affected by such factors as culture and education[17]. Simpson *et al*.[21] observed that douching practices are common in women of low educational and socioeconomic level as well as in young women at risk of STD, including sex workers[1].

Wang *et al*.[10], when studying Chinese sex workers, found that approximately 70% of them made regular use of VD, and came to the conclusion that no association existed between douching and the presence of genital infections. Similar results were observed by Amaral *et al*., where the practice of VD was detected in 60% of sex workers. No significant differences in VMF were found between VD users and non-users[1].

Numerous studies involving douching and genital infections point to the dilemma of establishing a cause and effect relationship. The difficulty lies in knowing whether pre-existing STD induced VD or if VD caused STD. Researchers also question whether VD is only a marker of sexual activity.

OBJECTIVE

The purpose of this study is to evaluate the relationship between VD and BV, STDs and HIV infection.

METHODS

This study used the MOOSE guidelines[22].

Inclusion Criteria

The criteria for studies inclusion were:

- prospective cohort studies of women using VD;
- women aged 12 years old or older; and
- studies published after January 2000 up to October 2011.

Studies in which women were asked to stop using intravaginal practices and those involving vaginal microbicides, placebo products, tampons or other devices to deliver medication, and the ones involving pregnant women, were excluded.

Search and selection of literature

Eligible studies were identified by searching the following databases: PubMed, Embase, Scielo and Google scholar. The studies were identified by a wide literature search of databases following medical subject heading terms and/or text words: “vagina”, “intravaginal”, “vaginal douching”, “cleansing”, “washing”, “intravaginal practices”, “insertion”, “genital lesions”, “HIV”, “STD”, “bacterial vaginosis”, “trichomoniasis”, “candidiasis”, “uterine cervicitis”, “uterine cervicitides”, “cervicitides”, “cervicitis”, “cervicit”, “endocervicit”, “vaginal discharge”, “pelvic inflammatory disease”, “cervicovaginal infections” and “cohort studies”. Reference lists of the identified publications for additional pertinent studies were reviewed. No language restrictions were imposed.

Three researchers searched for articles published up to October 2011. After searching the databases, 248 potentially relevant papers were identified, 185 of which were excluded after the review of both title and abstract. Reviews were done and disagreements were resolved by consensual discussion. Thus, 63 papers met the criteria and were reviewed in full. There were no articles in languages other than English which, based on the abstract analysis, met the criteria. The approved studies had their references researched for potential studies to be added in this meta-analysis. After a full review, 11 papers were included, but four coincident articles were found (they were in more than one database at the same time), remaining, finally, seven studies (**Figure 1**).

Data Extraction

Various study characteristics were extracted from the original reports and included in the meta-analysis. The extracted data included publication data (first authors’ last names, year of publication and country of studied population), number of new cases of specific outcome and follow-up period (**Table 1**). The methodological quality of the studies was assessed independently by three blind reviewers and the studies were given quality points for certain features (such as, type of studies and incidence evaluation), using the Newcastle-Ottawa scale. Disagreements were solved by mutual consensus.

Analysis

Data were entered in the Review Manager (RevMan) 5.1[23]. RevMan allows the user to enter protocols as well as complete reviews, including text, characteristics of studies, comparison table, and study data, and to perform analysis of the data entered. The total Risk Ratio was analyzed overall, using fixed and random effects models and was tested for heterogeneity of effects using the χ^2 test.

RESULTS

Outcomes

We defined STD, BV and HIV infection as the outcomes. Seven reports, involving 12,511 women, were included. The design features of cohort studies of vaginal issues incidence in women who use VD which were approved to the meta-analysis are shown in **Table 1**.

Sexually Transmitted Diseases

Only one study[24] made the relation between VD and Pelvic Inflammatory Disease (PID), *gonococcus* and chlamydial genital infections. It was a multicenter, prospective observational cohort study that happened in the US between 1999 and 2004. Of 2,740 women enrolled at the beginning, 1,541 of them did not meet the inclusion criteria or did not complete the baseline questionnaire. The 1,199 women left were the focus of the analyses; they were followed-up for up to four years.

The data were classified according to the frequency of VD as none (n = 733), once per month (n = 272) and twice or more times per month (n = 194). The four-year incident rate of PID was 10.9% and of gonococcus and/or chlamydial cervicitis was 21.9%. After adjustment for confounding factors, douching two or more times per month at baseline was not associated with PID (HR = 0.76; 95%CI

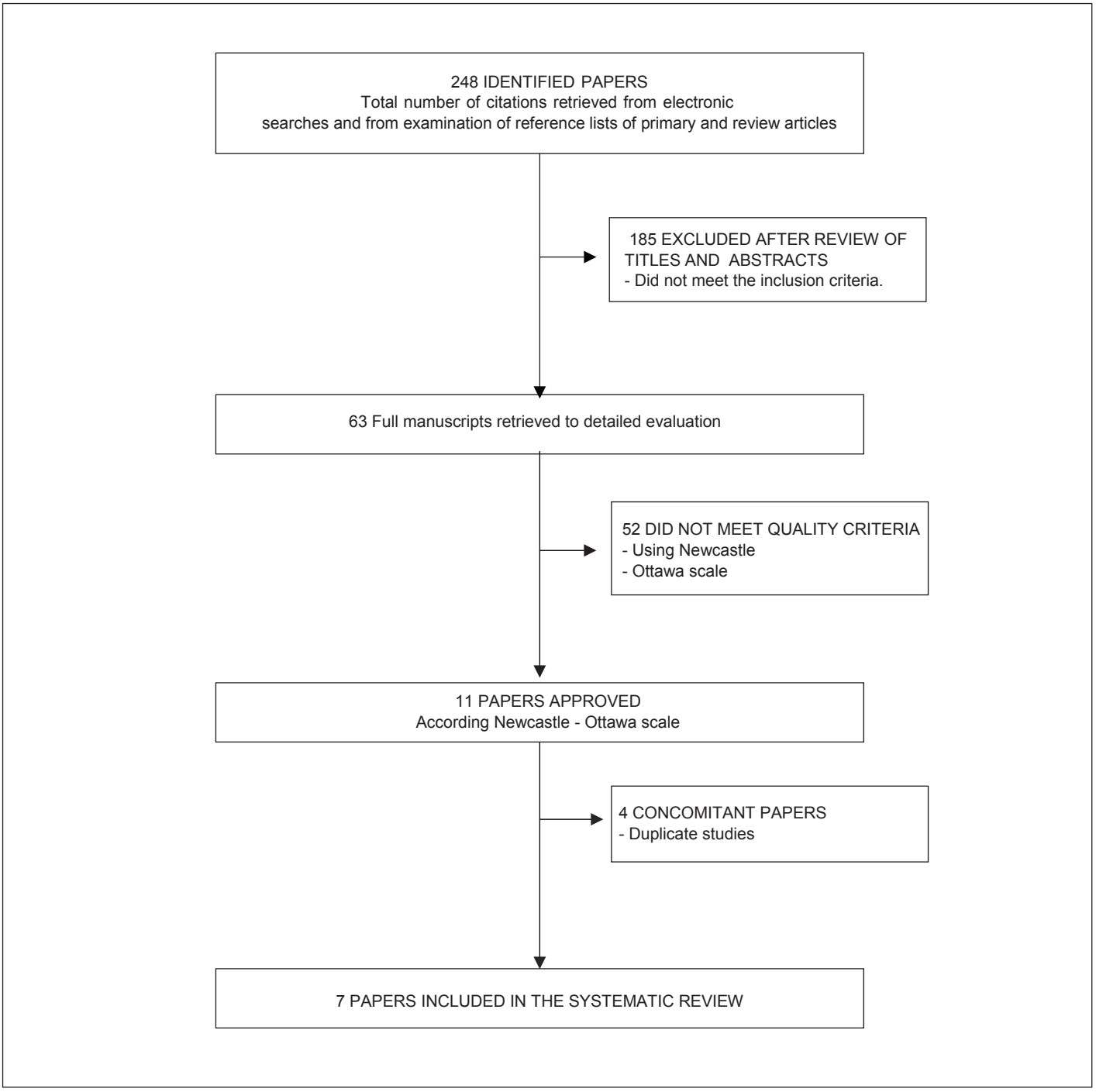

Figure 1 – Study selection process for systematic review.

0.42 – 1.38) or *gonococcus*/chlamydial genital infection (HR = 1.16; 95%CI 0.76 – 1.78)

Tsai *et al*.[25] made the association between douching and four sexually transmitted infections (*Trichomonas vaginalis*, *Chlamydia trachomatis*, *Neisseria gonorrhea*, and/or HSV-2). The study included 411 high-risk HIV infected and uninfected adolescent females aged 12 to 19 years old. They were enrolled in an observational prospective cohort that occurred in 13 US cities from 1996 to 1999. Out of the 411 adolescents who initiated the study, 43 of them were excluded, remaining 368 subjects who completed the cohort (64.8% were HIV infected). These women were divided into three groups, never douche (n = 88), intermittent douche (n = 230), and always douche (n = 50).

The results demonstrated that, compared to females who never douched, the time to STD was shorter for those who always douched (HR = 2.1; 95%CI 1.2 – 3.4) and for those who intermittently douched

Table 1 – Cohort studies design features of vaginal issues in women using vaginal douching included in the meta-analysis.

Study, year (reference)	Country	Period of follow-up	Number of users/Non users	Outcome and results
Ness, 2005[24]	US	4 years	467/732	STD (PID): Douching once per month aHR = 0.96 (95%CI 0.57 – 1.59) Douching two or more per month aHR = 0.76 (95%CI 0.42 – 1.38) Gonococcal/Chlamydial genital infections Douching once per month aHR = 1.03 (95%CI 0.70 – 1.51). Douching two or more per month aHR = 0.16 (95%CI 0.76 – 1.78)
Tsai, 2009[25]	US	3 years	88/280	STD: Users aHR: 1.8 (95%CI 1.1 – 3.1), Intermittent Users aHR: 1.4 (95%CI 0.9 – 2.0)
Brotman, 2008[28]	US	1 year	1,180/1,555	BV: RR = 1.21 (95%CI 1.08 – 1.38)
McClelland, 2008[29]	Kenya	378 days	130/21	BV -Douching 1 – 14 times per week: aHR = 1.29 (95%CI 0.88 – 1.89) Douching 15 – 28 times per week: aHR = 1.60 (95%CI 0.98 – 2.61) Douching >28 times per week: aHR = 2.39 (95% CI 35 – 4.23)
Rugpao, 2008[30]	Thailand	2 years	182/1,340	BV: HR = 1.30 (95%CI 0.8 – 2.01)
McClelland, 2006[31]	Kenya	468 days	1,199/71	HIV: Women who used water for douching: aHR = 2.64 (95%CI 1.00 – 6.97) Women who used soap for douching: aHR = 3.84 (95%CI 1.51 – 9.77)
Myer, 2006[32]	South Africa	4 years	928/2,642	HIV: aHR = 1.04 (95%CI 0.65 – 1.68)

STD: sexually transmitted disease; PID: pelvic inflammatory disease

(HR = 1.5; 95%CI 1.0 – 2.2). After adjusting for HIV status, race baseline sexual history, and age, the hazard of STI was 1.8 times larger for participants who always douched rather than for participants who never douched (95%CI 1.1 – 3.1), whereas the hazard of STI was 1.4 times larger for participants who intermittently douched than for participants who never douched (95%CI 0.9 – 2.0). Wong *et al.*[26], despite being a prospective study enrolling 503 sex works in Hong Kong, provided only prevalence rates, being excluded from the meta-analysis.

Bacterial Vaginosis

Assessing 1193 women which had vaginal swabs obtained for Gram stain for BV, culture for vaginal microflora, and DNA amplification for Neisseria gonorrhoeae and Chlamydia trachomatis at baseline and 6, 12, 24, and 36 months, Hutchinson *et al.*[27] observed that douching appeared to be associated with BV among women with already imbalanced flora but not among women with normal flora.

Three studies were approved to meet the BV outcome. Brotman *et al.*[28] followed 3,619 women aged 15 to 44 years old. They were recruited between August 1999 and February 2002 when visiting one of 12 clinics in Birmingham, Alabama, US. The presence of BV was evaluated according to Nugent and Gram stain criteria. Participants had a mean age of 23.6 years. The adjusted Relative Risk in those women who had douched was 1.13 (95%CI 1.05 – 1.22) (Table 1).

McClelland *et al.*[29] followed 151 Kenyan female sex workers, mean age 32 years old, with monthly visits, for approximately 378 days. The criteria for Gram stain were present in 56 (37%) of women at baseline. The practice of VD was stratified in the following ranges: 1 to 14 times a week, 15 to 28 times a week and above 28 times a week; finding, respectively, the following HR: 1.29 (95%CI 0.96 – 1.72), 1.47 (95%CI 1.08 – 1.99) and 1.94 (95%CI 1.36 – 2.76) (**Table 1**).

Rugpao *et al.*[30] selected 1,576 Thai women aging 18-35 years between November 1999 and September 2002. Fifty four women were BV positive at baseline and were excluded from analysis, remaining 1,522 of them. Cleaning inside the vagina was not correlated with BV (HR = 1.30, 95%CI 0.83 – 2.01) (**Table 1**).

HIV

In the context of the HIV outcome, two studies were approved. The first of them, McClelland *et al.*[31], analyzed the variations in susceptibility resulting from the practice of VD, following 1,270 Kenyan women for an average of 468 days, with a mean interval between the visits of 35 days. The HIV-1 seroconversion occurred in 222 women. Compared with women who did not undergo vaginal

douche, those who used water had triple the risk of HIV-1 seroconversion (aHR = 2.64, 95%CI 1.00 – 6.97), while those who used soap had a risk about four times higher (aHR = 3.84, 95%CI 1.51 – 9.77). Analyzing the Relative Risk separating those women who had douched from those who did not, we obtained a 2.57 (95%CI 1.09 – 6.03) relation (**Table 1**).

Myer *et al*.[32] noted that 85 of the 3,570 South African participants of their study, all practitioners of intravaginal procedures, tested positive for HIV infection, resulting in an adjusted Odds Ratio of 1.04 (95%CI 0.65 – 1.68) showing that, during the follow-up, there was no association between intravaginal practices and incident HIV.

DISCUSSION

As stated earlier, it is unclear whether VD is a direct cause or a cofactor in the progression of vaginal and/or systemic infections. It may also simply be a risk marker; none of the studies published so far have managed to clarify these possibilities. Given this fact, more recent studies have put this dilemma into question[21,33,34].

It is important to highlight that there are few studies fulfilling methodological queries to check the association between vaginal douching and vulvovaginal and systemic infections. No consensus could be reached regarding the cause-effect relationship between VD and BV acquisition, despite there being a weak positive correlation. Within the three selected studies, a significant positive correlation was observed in only two of them[28,29], specifically in women who douched more than 15 times or up to 14 times a week[29]. The fact that VD could be a risk marker allows us to assume that the risk of acquiring BV could possibly increase with increased vaginal douching frequency. As a result of this train of thought, the studies were used to construct a forest plot graph (**Figure 2**) in order to determine the strength of the correlation[28–30]. The graph weakly suggests that the higher the frequency of VD, the more likely a woman is to develop BV. The global Risk Ratio for BV acquisition for high frequency of VD users is 1.24 (95%CI 1.12 – 1.43), representing a statistically significant result.The data from the Hutchinson *et al*.[27] study could not be included due to the fact that it was incomplete.

On the other hand, no positive correlation was found between douching and STD and/or HIV infection. Two studies evaluated the correlation between VD and STD[24,25] and one[24] did not find a positive correlation. Tsai *et al*.[25] carried out their study over a 3-year period and examined the association between VD and four STDs (*T. vaginalis, C. Trachomatis, N. gonorrhea, and* HSV-2*)* in adolescents at risk of HIV-infection and uninfected female adolescents aged 12 to 19 years old. VD users were found to acquire STDs in a shorter period of time when compared to douching Non-Users. The adjusted hazard for STD was 1.8 times higher for frequent douching Users and 1.4 times higher for intermittent VD users when compared to VD Non-users. However, the results were limited: the study was conducted in a defined population of female adolescents with high-risk behavior, two thirds of which had HIV. These findings may not be generalizable to lower-risk adolescent populations with different sociodemographic, immunological, and/or behavioral characteristics. Furthermore, the study used self-report for the main exposure variable to classify the level of vaginal douching for each female. Additionally and mainly, similar to cross-sectional studies, a limitation of this analysis is that causality is unknown, as vaginal douching could have been precipitated by the STD itself as a response to discomfort or vaginal discharge.

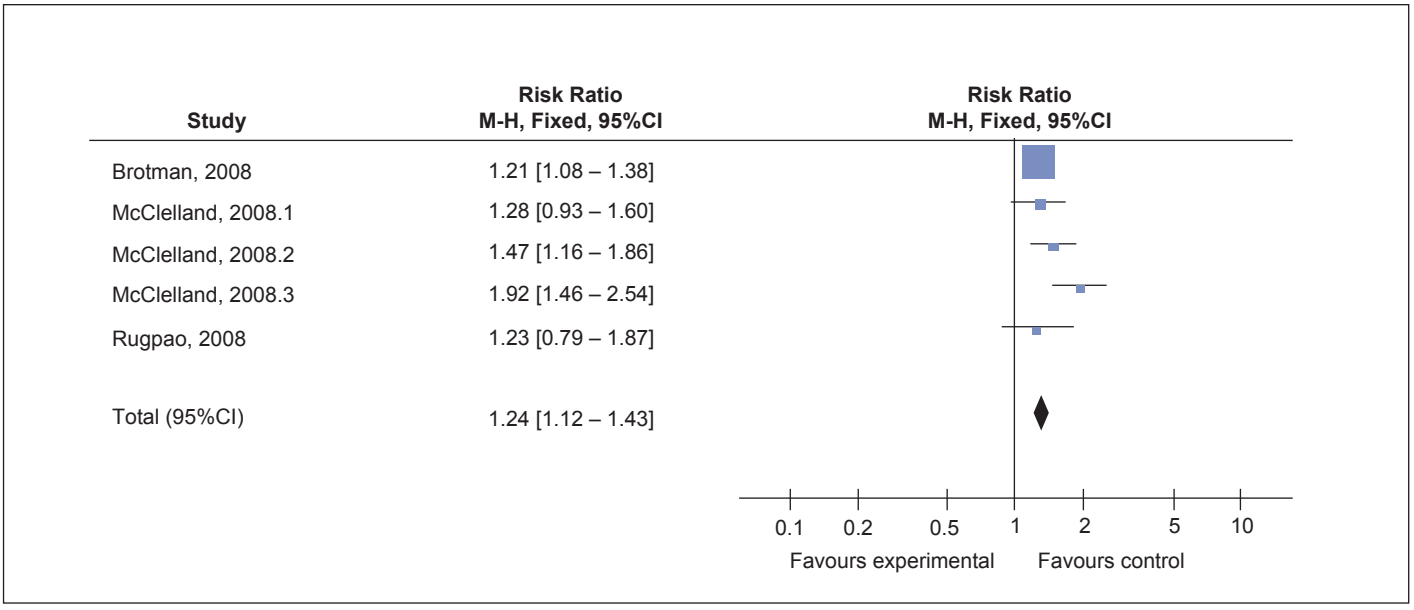

Figure 2 – Forest plot of bacterial vaginosis studies. McClelland *et al.*[31] was separated into three different ranges due to vaginal douching frequency: McClelland, 2008.1 = 1 to 14 times a week; McClelland, 2008.2 = 15 to 28 times a week and McClelland, 2008.3 = more than 28 times a week.

The only study which did not confirm a positive correlation was the one by Ness[24]. After adjusting for confounding factors, this study found that vaginal douching two or more times per month at baseline was not associated with neither PID (aHR = 0.76, 95%CI 0.42 – 1.38) nor *gonococcus*/Chlamydial Genital Infection (aHR=1.16, 95%CI 0.76 – 1.78). These three studies seem to point to the fact that VD frequency is an important factor to the determination of a positive correlation.

Figure 3 evaluates the relationship between VD and STDs. Two studies were included[24,25], one of which was divided in two[24] due to different outcomes (*Gonococcus* and Chlamydial Lower Genital Tract Infection, and PID). Tsai *et al*.[25] had two incidence measures (frequent douching users and intermittent douching users) synthesized into one, using RevMan[23], such to compare with non-users. The final graph shows a non-significant result, similar to HIV.

Similarly to the vaginal douching-BV correlation, disagreement was also found between the two studies regarding the causal relationship between VD-HIV (**Figure 4**). McClelland *et al*.[31] showed a positive correlation between these factors; while Myer *et al*.[32] did not. This might suggest specific mechanisms triggered by vaginal tract washing which could catalyze the process of viral invasion.

CONCLUSION

One of the greatest limitations in our meta-analysis was the scarcity of articles found in the literature considering the possible influence of vaginal douching on vulvovaginal and systemic infections. This gap in the research was also observed in studies specifically evaluating vaginal douching and cervicitis incidence. Only one study[24] addressing the issue in accordance with the inclusion criteria for of this work was found.

More methodologically correct and diversified research is needed to reach conclusive results concerning vaginal douching.

Conflict of interests

The authors declare no conflict of interests.

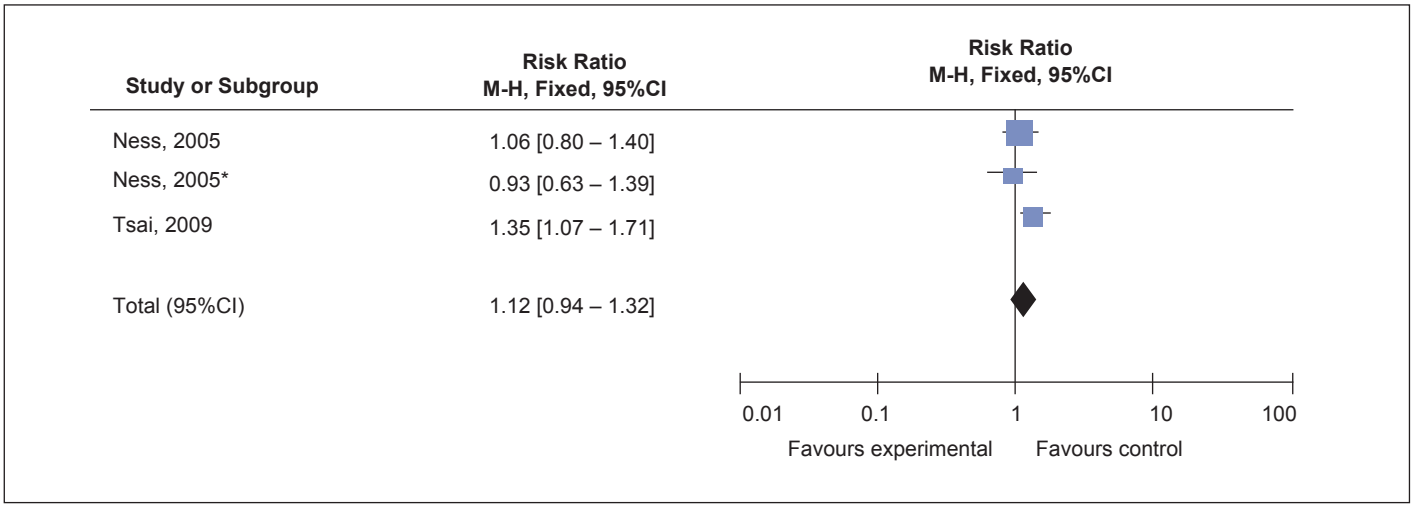

Figure 3 – Forest plot of Sexually Transmitted Diseases studies. Ness (2005) and Ness (2005)* are the same study. The outcome for the first study was Gonococci and Chlamydial Lower Genital Tract Infection while the second evaluated pelvic inflammatory disease.

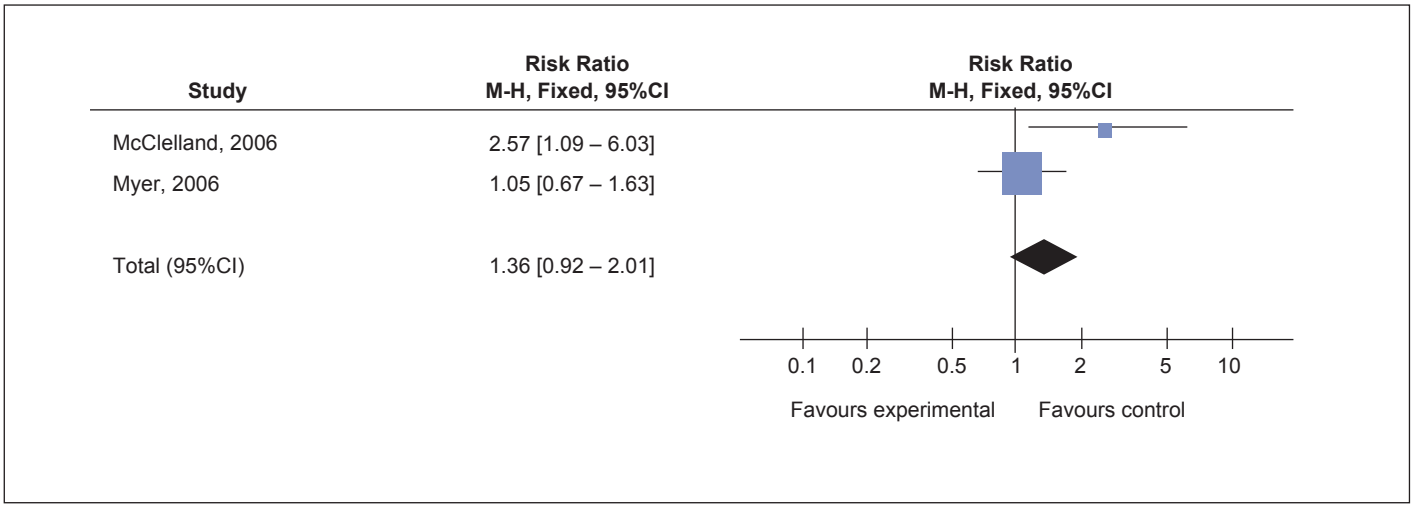

Figure 4 – Forest plot of HIV studies.

REFERENCES

1. Amaral R, Giraldo PC, Goncalves AK, Junior JE, Santos-Pereira S, Linhares I *et al*. Evaluation of hygienic douching on the vaginal micro flora of female sex workers. Int J STD AIDS. 2007;18(11):770-3.
2. Nomelini RS, Carrijo APB, Adad SJ, Nunes AA, Murta EFC. Relationship between infectious agents for vulvovaginitis and skin color. Sao Paulo Med J. 2010;128(6):348-53.
3. Martin DH. The Microbiota of the Vagina and Its Influence on Women's Health and Disease. Am J Med Sci. 2012;343(1):2-9.
4. Giraldo PC, Amaral RL, Juliato C, Eleutério J Jr, Brolazo E, Gonçalves AK.The effect of "breathable" panty liners on the female lower genital tract. Int J Gynaecol Obstet. 2011;115(1):61-4.
5. Neggers YH, Nansel TR, Andrews WW, Schwebke JR, Yu KF, Goldenberg RL *et al*. Dietary intake of selected nutrients affects bacterial vaginosis in women. J Nutr. 2007;137:9.
6. Hutchinson KB, Kip KE, Ness RB. Gynecologic Infection Follow-Through (GIFT) Investigators. Vaginal douching and development of bacterial vaginosis among women with normal and abnormal vaginal microflora. Sex Transm Dis. 2007;34(9):671-5.
7. Rathod SD, Krupp K, Klausner JD, Arun A, Reingold AL, Madhivanan P. Bacterial vaginosis and risk for Trichomonas vaginalis infection: a longitudinal analysis. Sex Transm Dis. 2011;38(9):882-6.
8. Coleman JS, Hitti J, Bukusi EA, Mwachari C, Muliro A, Nguti R *et al*. Infectious correlates of HIV-1 shedding in the female upper and lower genital tracts. AIDS. 2007;21(6):755-9.
9. Low N, Chersich MF, Schmidlin K, Egger M, Francis SC, van de Wijgert JH *et al*. Intravaginal practices, bacterial vaginosis, and HIV infection in women: individual participant data meta-analysis. PLoS Med. 2011;8(2):e1000416.
10. Wang B, Li X, Stanton B, Yang H, Fang X, Zhao R *et al*. Vaginal douching, condom use, and sexually transmitted infections among Chinese female sex workers. Sex Transm Dis. 2005;32(11):696-702.
11. Peters SE, Beck-Sague CM, Farshy CE, Gibson I, Kubota KA, Solomon F *et al*. Behaviors associated with Neisseria gonorrhoeae and Chlamydia trachomatis: cervical infection among young women attending adolescent clinics. Clin Pediatr (Phila). 2000;39(3):173-7.
12. Cherpes TL, Meyn LA, Krohn MA, Hillier SL. Risk factors for infection with herpes simplex virus type 2: role of smoking, douching, uncircumcised males, and vaginal flora. Sex Transm Dis. 2003;30(5):405-10.
13. Wolner-Hanssen P, Eschenbach DA, Paavonen J, Stevens CE, Kiviat NB, Critchlow C *et al*. Association between vaginal douching and acute pelvic inflammatory disease. JAMA.1990;263(14):1936-41.
14. Baird DD, Weinberg CR, Voigt LF, Daling JR. Vaginal douching and reduced fertility. Am J Public Health. 1996;86(6):844-50.
15. Caliskan D, Subasi N, Sarisen O. Vaginal douching and associated factors among married women attending a family planning clinic or a gynecology clinic. Eur J Obstet Gynecol Reprod Biol. 2006;127(2):244-51.
16. Hacialioglu N, Nazik E, Kilic M. A descriptive study of douching practices in Turkish women. Int J Nurs Pract. 2009;15(2):57-64.
17. Cottrell BH, Close FT. Vaginal douching among university women in the southeastern United States. J Am Coll Health. 2008;56(4):415-21.
18. Martino JL, Youngpairoj S, Vermund SH. Vaginal douching: personal practices and public policies. J Womens Health (Larchmt). 2004;13(9):1048-65.
19. Hilber AM, Chersich MF, van de Wijgert JH, Rees H, Temmerman M. Vaginal practices, microbicides and HIV: what do we need to know? Sex Transm Infect. 2007;83(7):505-8.
20. Mardh PA. The vaginal ecosystem. Am J Obstet Gynecol. 1991;165(4 Pt 2):1163-8.
21. Simpson T, Merchant J, Grimley DM, Oh MK. Vaginal douching among adolescent and young women: more challenges than progress. J Pediatr Adolesc Gynecol. 2004;17(4):249-55.
22. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D *et al*. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. JAMA. 2000;283(15):2008-12.
23. Review Manager (RevMan) [Computer program] Version 5.1 Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration. 2011.
24. Ness RB, Hillier SL, Kip KE, Richter HE, Soper DE, Stamm CA *et al*. Douching, pelvic inflammatory disease, and incident gonococcal and chlamydial genital infection in a cohort of high-risk women. Am J Epidemiol. 2005;161(2):186-95.
25. Tsai CS, Shepherd BE, Vermund SH. Does douching increase risk for sexually transmitted infections? A prospective study in high-risk adolescents. Am J Obstet Gynecol. 2009;200(1):38 e1-8.
26. Wong WC, Yim YL, Lynn H. Sexually transmitted infections among female sex workers in Hong Kong: the role of migration status. J Travel Med. 2011;18(1):1-7.
27. Hutchinson KB, Kip KE, Ness RB. Vaginal douching and development of bacterial vaginosis among women with normal and abnormal vaginal microflora. Sex Transm Dis. 2007; 34(9):671-5.
28. Brotman RM, Klebanoff MA, Nansel TR, Andrews WW, Schwebke JR, Zhang J *et al*. A longitudinal study of vaginal douching and bacterial vaginosis--a marginal structural modeling analysis. Am J Epidemiol. 2008;168(2):188-96.
29. McClelland RS, Richardson BA, Graham SM, Masese LN, Gitau R, Lavreys L *et al*. A prospective study of risk factors for bacterial vaginosis in HIV-1-seronegative African women. Sex Transm Dis. 2008;35(6):617-23.
30. Rugpao S, Sriplienchan S, Rungruengthanakit K, Lamlertkittikul S, Pinjareon S, Werawatakul Y *et al*. Risk factors for bacterial vaginosis incidence in young adult Thai women. Sex Transm Dis. 2008;35(7):643-8.
31. McClelland RS, Lavreys L, Hassan WM, Mandaliya K, Ndinya-Achola JO, Baeten JM. Vaginal washing and increased risk of HIV-1 acquisition among African women: a 10-year prospective study. AIDS. 2006;20(2):269-73.
32. Myer L, Denny L, de Souza M, Wright TC Jr, Kuhn L. Distinguishing the temporal association between women's intravaginal practices and risk of human immunodeficiency virus infection: a prospective study of South African women. Am J Epidemiol. 2006;163(6):552-60.
33. Chatwani AJ, Hassan S, Rahimi S, Jeronis S, Dandolu V. Douching with Water Works device for perceived vaginal odor with or without complaints of discharge in women with no infectious cause of vaginitis: a pilot study. Infect Dis Obstet Gynecol. 2006;2006:95618.
34. Drago L, De Vecchi E, Nicola L, Zucchetti E, Gismondo MR, Vicariotto F. Activity of a Lactobacillus acidophilus-based douche for the treatment of bacterial vaginosis. J Altern Complement Med. 2007;13(4):435-8.

Address for correspondence:
ROSE LUCE AMARAL
Cidade Universitária "Zeferino Vaz", Universidade Estadual de Campinas
Rua Alexander Fleming, 101
Campinas (SP), Brasil
CEP: 13083-881
Tel: +55 (19) 3521-9306
E-mail: giraldo@unicamp.br

Received on: 08.11.2013
Approved on: 12.10.2013