

Intravaginal Practices and *Chlamydia Trachomatis* and *Candida Albican* Infection: A Cross-Sectional Study among Women from Various Regions Residing in the City of Yaoundé- Cameroon

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ABSTRACT

OBJECTIVE: Intravaginal practices are practised by some Cameroonian women. We assess the frequency of occurrence of certain STIs (*Chlamydia*) and Candidiasis and its association with the type and frequency of the vaginal practices done by these women of various ethnic groups living in the city of Yaoundé.

SETTING: The women were recruited as they came for the free medical screening campaign organized by the institute of medical research and medicinal plant studies to accompany the international day of the woman.

PARTICIPANTS: 125 women were included in the study comprising the following regions: West (34.4%), Centre (32%), Littoral and South (9.6%), North west (4.8%), Extreme North (4%) and South west (2.4%).

METHODS: Cervico-vaginal smears and blood were collected by the trained researchers, and the cervico-vaginal swabs samples were then cultured by standard laboratory methods for *Candida spp.* and then wet mounts and Gram-stained were analysed by microscopy at 40- and 100 magnifications to identify *Candida spp.* Blood sample were also centrifuged and its serum was used to test for *C. trachomatis* using the ELISA techniques according to the manufacturer's instructions.

PRIMARY OUTCOMES: Determinants of IVPs use and *C. trachomatis* and *Candida albican* infection via bivariable and multivariable logistic regression.

RESULTS: The majority of the females were single 58.4% (73/125), and had a tertiary level of education 68.9% (86/125). Intimate vaginal hygiene was regularly practiced by 72% (90/125) of the women, among them, (12) was diagnosed with *chlamydia trachomatis*, (15) with *candida albican* and (1) was diagnosed with both infections respectively. 37.6% agreed to clean the inside of their vaginal cavity and 32.8% affirmed that they clean the inside of their vaginal cavity by scraping the vaginal walls with their fingers, while 68% agreed that they do practice vaginal douching and the majority affirmed to use simple water 60.8% while 13.6% agreed that they do insert traditional products into their vaginal and they have been doing that for more than 1 year now (7.2%) while 85.6% affirmed that it was recommended to them by the traditional doctor.

CONCLUSION: In city of Yaoundé, intravaginal practices are common among women. Those who regularly practiced intimate vaginal hygiene were more exposed to *chlamydia trachomatis* and *candida albican* infections; (2) those who cleaned the inside of their vaginal cavity by scraping their vaginal walls with their fingers, had more of *candida albicans* infections than *chlamydia trachomatis* infections; (3) those who practice vaginal douching had more of both infections; and those who used more of simple water for their vaginal douching, were more exposed to *chlamydia trachomatis* and *candida albicans* infections than those who used hygienic water and other products. Therefore, intravaginal practices were a determinant of *C. trachomatis* and *candida albican* infection.

KEYWORD: Intravaginal practices, chlamydial, candidiasis and women.

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INTRODUCTION

Depending on cultural habits, women worldwide often engage in a variety of vaginal hygiene practices, such as the use of intravaginal douches, herbal vaginal steam baths or the direct insertion of herbs into the vagina.[1–4] Studies in the USA showed that women who had less income, less education, were unmarried, lived in the southern States and were of African–American descent were more likely to engage in such practices when compared with white women.[2] Vaginal practices are intended for feeling clean and fresh, getting rid of vaginal malodour, or removing residual menstrual blood,[5 6] and for improving the appearance of the vagina and for enhancing sensation during intercourse, and securing the relationship with, the male partner.[2] However, these practices may increase the risk of acquiring infections, such as HIV,[4] human papilloma virus,[7] but also bacterial sexually transmitted infections (STI), fungal and trichomoniasis.[8] Particularly, intravaginal practices, such as use of water and soap, the insertion of a cloth or a piece of paper into the vagina, to dry and tighten the vagina was associated with acquiring HIV.[4] An underlying mechanism for this may be that intravaginal practices deplete the relative amount of vaginal *Lactobacillus* sp.[4,9] *Lactobacilli* produce antimicrobials and acidify the vagina by lactic-acid production and are thus considered to be a hallmark for vaginal health; their depletion is known to mediate HIV , fungal and STI acquisition.[4, 10–13] Risk for STI (*Chlamydia* and *Candidiasis*) may be further increased by a breakdown of the vaginal epithelial barrier and sometimes even the occurrence of lacerations.[3] In addition, a lack of vaginal fluids increases the risk of condom rupture. Although several studies have reported an association between vaginal practices and STI or fungi, [1, 8, 14] other studies did not. [15, 16] Unfortunately, earlier studies did not consider the type of vaginal practice nor the frequency of their use.

In this study, we examined the frequency of occurrence of certain STIs (*Chlamydia*) and *Candidiasis* and its correlation with the type and frequency of vaginal practices in women who attended the free medical screening campaign organized by the centre in commemoration to several other activities launched by the institute of Medical research and medicinal plant studies to accompany the international day of the woman.

SUBJECTS, MATERIALS, AND METHODS

Subjects. The study was cross sectional, population comprised women 15–70 years of age. Each of the participant was given a unique code then the researcher interviewed the participant about their demographic characteristics, including self-reported ethnic background, age, occupation, residence, marital status and level of education. Criteria for exclusion were age below 15 years.

Vaginal hygiene practices

Using a structured questionnaire and after obtaining a written and verbal consent from each participant and assuring them of the anonymity and confidentiality of their information, the researchers then asked the women in detailed if they regularly practice intimate vaginal hygiene , if they did cleaned the inside of their vaginal cavity , If yes, with what type of IVP (Intra vaginal practices), if they did practice vaginal douching , If yes with which product ; simple water, hygienic product or any other specific product, if they did insert traditional products into the vagina, If yes, then for how long have they been applying this product and who recommended this product to them.

Specimen collection and testing procedures

Cervico-vaginal smears and blood were collected by the trained researchers, and immediately transported to the bacteriology and biochemistry units of the Human Biology laboratory of the centre. Here, the cervico-vaginal swabs samples were cultured by standard laboratory methods for *Candida spp.* and then wet mounts and Gram-stained were analysed by microscopy at 40- and 100 magnifications to identify *Candida spp.* Blood sample were also centrifuged and its serum was used to test for *C. trachomatis* using the ELISA techniques according to the manufacturer's instructions.

Statistical Analysis

To examine the associations between IVPs and *chlamydia trachomatis* and *candida albican* infection, IVPs was the Main exposure variables and *chlamydia trachomatis* and *candida albican* infection were the main outcome.

RESULTS

From our results, we had a total of 125 women, had an overall frequency of 21 (20.19%) *candida albican* infections and 14 (13.09%) of *chlamydia trachomatis* infections. Table 1 displays participants' characteristics. 34.4% (43/125) of the participants were from the west region, 96.8% (121/125) affirmed that they were female, 4.8% (6/125) were pregnant, the age range of (25-29) years was the most represented (31.2%), the majority of the females were single 58.4 % (73/125), residence in the urban city of Yaoundé 72.8% and had a tertiary level of education 68.9% (86/125). 72% (90/125) do regularly practice intimate vaginal hygiene, 37.6 % agreed to clean the inside of their vaginal cavity and 32.8% affirmed that they clean the inside of their vaginal cavity by scraping the vaginal walls with their fingers, while 68% agreed that they do practice vaginal douching and the majority affirmed to use simple water 60.8% while 13.6% agreed that they do insert traditional products into their vaginal and they have been doing that for more

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than 1 year now (7.2%) while 85.6%. affirmed that it was recommended to them by the traditional doctor Detailed descriptive characteristics of IVPs can be found in Supplementary Table 1.

From our bivariate and multivariate analyses (table 2), among those who regularly practice intimate vaginal hygiene 90 (72%), (12) of them was diagnosed with *chlamydia trachomatis*, (15) with *candida albican* and (1) was diagnosed with both infections respectively. Meanwhile, among those who clean the inside of their vaginal cavity 47 (38%) , 6 of them were diagnosed with *chlamydia trachomatis*, (7) with *candida albican* and none of them had both infections respectively. Moreover, among those who practice vaginal toilet by scraping the vaginal walls with their fingers 41 (33%) , (3) of them had *chlamydia trachomatis*, (5) of them had *candida albican* and none had both infections respectively and among those who practise vaginal douching 85 (65%), (11) of them had *chlamydia trachomatis*, (15) of them had *candida albican* and (1) had both infections respectively while among those who used simple water (76) , (7) had *chlamydia trachomatis*, (9) had *candida albican* and none had both. Meanwhile, among those who do insert traditional products into their vagina (17), three(03) of them was diagnosed with *chlamydia trachomatis*, five (05) with *candida albican* and none of them had both and among those who have been applying this practice for more than one year, three (03) of them had *chlamydia trachomatis*, two (02) had *candida albican* and none had both.

Table 1. Demographic and Behavioral Characteristic of the study sample

Characteristics	N	%
Region of origin		
- Center	40	32
- East	4	3.2
- Extreme North	5	4
- Littoral	12	9.6
- North west	6	4.8
- West	43	34.4
- South	12	9.6
- South west	3	2.4
Gender		
- Female	121	96.8
- No response	4	3.2
Are you pregnant		
- YES	6	4.8
- NO	114	91.2
- NO RESPONSE	5	4
If yes, give the age of the pregnancy		
- First semester		
- Second semester		
- Third semester		4
	5	
Age [Years]		
- 15 – 24	32	25.6
- 25 - 29	39	31.2
- 30-39	24	19.2
- 40≥	28	22.4
Nationality		
- Cameroonian	119	95.2
- No response	6	4.8
Occupation		
- Formal job	43	34.4
- Informal job	21	16.8
- Student	53	42.4
Residence		
- Urban	91	72.8

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-	Semi-urban	24	19.2
-	Rural	4	3.2
Marital status			
-	Single	73	58.4
-	Married	31	24.8
-	Divorced	4	3.2
-	Concubinage	4	3.2
-	Widow	2	1.60.8
-	Other specify	1	
If Married specify:			
-	Monogamous or	29	23.2
-	Polygamous		
Level of education:			
-	Primary	3	2.4
-	Secondary	27	21.6
-	Higher Education	86	68.87.2
-	No response	9	7.2
Do you regularly practice intimate vaginal hygiene?			
			72
-	Yes	90	20
-	No	25	
Do you clean the inside of your vaginal cavity?			
-	Yes	47	37.6
-	No	74	59.2
If yes, what type of IVP (Intra vaginal practices)? Vaginal toilet by scraping the vaginal walls with the fingers:			
			32.8
-	Yes	41	28.8
-	No	36	
Do you practice vaginal douching?			
-	Yes	85	68
-	No	31	24.8
If yes with which product?			
-	Simple water	76	60.8
-	Hygienic	12	9.6
-	Other specify	7	5.6
Do you insert traditional products into the vagina?			
			13.6
-	Yes	17	79.2
-	No	99	
If yes, how long have you been applying this practice?			
			0.8
-	Since childhood	1	0.8
-	Always	1	0.8
-	Rarely	1	0.8
-	For a wide now	1	3.2
-	1-6month now	4	4.8
-	-6 months- 1year now	6	7.2
-	1 year – 5 years	9	0.8
-	5 years +	1	

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If yes, who recommended this product to you?

- Friends	3	2.4
- Parents	5	4
- Traditional doctor	107	85.6
- Internet	4	3.2
- Road vendors	1	84.8
- Doctor	106	0.8
- Grandmother	1	4
- No body	5	

Table 1 displays participants' characteristics. Seventy two percent (90/125) of participants had ever performed intimate vaginal hygiene; of these 37.6% (47/125) had clean the inside of the vaginal cavity while 13.6% (17/125) do insert traditional products into their vagina and 7.2% (9/125) affirm applying this traditional products for 1 to 5 years now and 107 (85.6%) said it was recommended to them by the traditional doctors . Most participants (60.8%) used simple water, while just 9.6% use hygienic solutions and 5.6% use other solutions.

Table 2. Bivariate and multivariate associations between the intravaginal practices of the subjects and the presence of *chlamydia trachomatis*, *Candida albicans* , *chlamydia trachomatis* and *candida albicans* coinfection.

Characteristics	N	Subjects with <i>Chlamydia trachomatis</i> infection	Subjects without <i>Chlamydia trachomatis</i> infection	Subjects with <i>Candida albicans</i> infection	Subjects without <i>Candida albicans</i> infection	<i>chlamydia trachomatis</i> and <i>candida albicans</i> coinfection.
Do you regularly practice intimate vaginal hygiene?						
- Yes	90	12	65	15	55	1
- No	25	2	18	5	16	0
Do you clean the inside of your vaginal cavity?						
- Yes	47	6	29	7	27	0
- No	74	8	57	4		1
If yes, what type of IVP (Intra vaginal practices)?						
- Vaginal toilet by scraping the vaginal walls with the fingers:						
- Yes	41	3	28	5	26	0
- No	36	4	26	9	19	0
Do you practice vaginal douching?						
- Yes	85	11	59	15	50	1
- No	31	2	25	5	21	0
If yes with which product?						
-Simple water	76	7	52	9	4	0
-Hygienic	12	3	8	6	0	1
-Other specify	7	2	4	1	4	0
Do you insert traditional products into the vagina?						
- Yes	17	3	11	4	8	0
- No	99	11	71	17	61	1
If yes, how long have you been applying this practice?						

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-Since childhood	1	/	/	/	/	/
- Always	1	/	/	/	/	/
- Rarely	1	/	/	/	/	/
- For a wide now	1	/	/	/	/	/
-1-6month now	4	/	/	/	/	/
-6 months- 1year now	6	/	/	/	/	/
- 1– 5 years	9	3	/	2	/	/
- 5 years +	1	/	/	/	/	/
If yes, who recommended this product to you?				0		0
- Friends				0		0
- Parents						
- Traditional doctor				0		0
- Internet						
- Road vendors				0		0
- Doctor				0		0
- Grandmother				0		0
- No body						

DISCUSSION

We assessed the intra-vaginal practices of women from various ethnic groups living in the capital city of Cameroon, Yaoundé and examined their correlation with certain infections like *chlamydia trachomatis* and *candida albican* infections, and found that: (1) those who regularly practiced intimate vaginal hygiene were more expose to *chlamydia trachomatis* and *candida albican* infections; (2) those who cleaned the inside of their vaginal cavity by scraping their vaginal walls with their fingers, had more of *candida albicans* infections than *chlamydia trachomatis* infections; (3) those who practise vaginal douching had more of both infections ; and those who used more of simple water for their vaginal douching, were more expose to *chlamydia trachomatis* and *candida albicans* infections than those who used hygienic water and other products though these other products were not specified. Our results are similar to that of Delia Scholes *et al* [17] , who concluded from their work that women who reported practising **douching in the 12 months before their clinic visit had an increased likelihood of chlamydial infection compared with women who did not douche (prevalence odds ratio [OR] 2.29, 95% confidence interval [CI] 1.22, 4.30, after adjusting for confounding factors) and that the likelihood was higher for women who reported douching more often: OR 2.60 (95% CI 1.29, 5.24) for women who douched one to three times per month, and OR 3.84 (95% CI 1.26, 11.70) for those douching four times or more per month. Our work was also similar to the work of Peters *et al.* [18], who found that douching at least monthly was significantly associated with *chlamydia* in adolescents and also with the work of Beck-Sague *et al.* [19] , who also found that, in adolescents who douched monthly or more frequently, there was a higher prevalence of *chlamydia*.**

Douching is believed to alter the dominant flora of the vagina and, thus, increase susceptibility to bacterial viginoses [20,21] , also Vulvovaginal candidiasis is the second most common cause of vaginitis in the United States and the most common cause in Europe[22] confirming the prevalence of *Candida* infection in our work.

CONFLICT OF INTEREST STATEMENT

We declare that we have no conflict of interest.

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