

Prevalence of vulvovaginitis in sexually active women from riverside communities in Brazilian Amazonia

ABSTRACT

Aims: Analyze the prevalence of vulvovaginitis in sexually active adult women, residents of riverside communities in Brazilian Amazonia, receiving health services through the “Luz na Amazônia” program in 2013 and 2014.

Study design: Population based cross-sectional and evaluative study.

Place and Duration of Study: “Luz na Amazônia” Program and *Laboratory of Clinical and Environmental Mycology* from the Federal University of Para (UFPA), between January 2013 and December 2014.

Methodology: The analytical cross-sectional study was made with bacterioscopy and fresh examination of vaginal secretion and the results were statistically analyzed with software BioEstat 5.0.

Results: The prevalence of vulvovaginitis was 78,57%, and the prevalence of bacterial vaginosis, genital infection by *Candida spp* and vaginitis caused by *Trichomonas vaginalis* was 66,07%, 28,57% and 8,92%, respectively. Statistically significant association was found between the signs, symptoms and vulvovaginitis.

Conclusion: Due to the necessities of this population and the high prevalence of vulvovaginitis found, becomes evident the importance of projects which aim the prevention and promotion of health education for women from these communities to be encouraged to seek medical exams more often, in order to minimize the cases of vaginitis and vaginosis in these communities.

Keywords: prevalence, vulvovaginitis, riparian, Amazonia

1. INTRODUCTION

Vulvovaginitis are inflammatory and/or infectious manifestations in the inferior feminine genital tract, which affect vulva, vagina and uterine cervix's scaly epithelium [1]. Nowadays, they represent one of the major causes of infectious vaginal discharge among sexually active women and one of the principal reasons for women to search for medical care [2]. They are the more frequent cause of vaginal leucorrhea and if not diagnosed and treated properly can greatly increase the chance for the development of gynecological complications. Those infections can be distributed in three groups, according to the microbial agents which promote them: bacterial vaginosis, candidiasis and vaginal trichomoniasis [3]. The bacterial vaginosis is considered the more prevalent infection among women in reproductive age, being defined as an alteration of the normal vaginal microbiota and characterized by proliferation of anaerobic bacteria [4]. *Gardnerella vaginalis* (*G. vaginalis*), which has coccobacilli form, is short, gram variable, pleomorphic, not capsulated, immobile and is facultative anaerobic, being the main bacteria found causing bacterial vaginosis [5]. The increasing of pH and decrease of lactobacilli makes propitious the growth of various bacteria in the vaginal microbiota, causing vaginosis [6]. Bacterial vaginosis are not considered sexually transmitted diseases [7].

The infection by vaginal *Candida* is the main cause of fungal vulvovaginitis [8]. Such infection is characterized by an inflammation due to a *Candida* species, normally *Candida albicans* [9], responsible for 85% to 90% of the cases [10]. Vaginal candidiasis has as principal clinical manifestations: itchiness, leucorrhea, whitish plates, edema, and erythema of both vulva and vagina [11].

Throughout their lives, is estimated that 75% of women will have an episode of candidiasis, 40% to 50% may have a second infection and about 5% can acquire a chronic infection pattern, with repetitive episodes [12]. Some microbiologists suggest that *Candida spp.* is present on the normal microbiota of adult women, asymptotically. Thus, the asymptomatic colonization can occur in 25 to 50% of women [13]. Some factors predispose for the microbiota imbalance and rise of candidiasis, such as: use of oral contraceptives; treatment with corticosteroids; long-time use of antibiotics; inadequate personal hygiene; endocrine disorders; synthetic underwear, which decreases ventilation and increase humidity as well as the local heat; sexual relationships; stress; immunodeficiency, such as infection by the Human Immunodeficiency Virus (HIV) [1].

Trichomoniasis is the most common non-viral sexually transmitted disease around the world [14], caused by the protozoan *Trichomonas vaginalis* (*T. vaginalis*). *In vitro* studies related the adhesion of *T. vaginalis* to host's target cells to be essential for infection maintenance and cytopathogenicity, damaging cells after the release of soluble cytotoxins, which play a role in both virulence and adhesion [15]. The symptoms include purulent vaginal discharges, vulvar irritation, inflammation and hemorrhagic lesions in the cervix [13].

Therefore, genital tract diseases are caused by bacteria, fungi and protozoa, represent an important portion of the paradigm health versus illness, which if not treated can worsen, making important that health professionals pay close attention to communities where access to health services is deficient and precarious. Women residing in Amazonian riverine communities are example of people who are impacted by the lack of access to information and health services, as they are more subjected to aggravation in cases of genital tract diseases.

This way, this study in partnership with the “*Luz na Amazônia*” program, through an agreement with the Federal University of Pará (UFPA) tries to remedy the need Amazonian riverside populations have for clinical, laboratory assistance and treatment for their illnesses as a way to decrease the incidence and prevalence of infections and/or diseases of simplified diagnostic and treatment.

The objective of this study is to determine the prevalence of vulvovaginitis caused by *Gardnerella vaginalis*, *Candida spp.* and *Trichomonas vaginalis* in adult women, sexually active, residents from Amazonian riverine communities, assisted by the “*Luz na Amazônia*” program, through evaluation of their clinical and epidemiological status as well as hygiene habits and sexual activity, which may be associated with the incidence and maintenance of infections.

2. MATERIAL AND METHODS

The project can be described as an analytical cross-sectional study which in the population was observed at each visit by the “*Luz na Amazônia*” boat at the riverside communities *Genipaúba* and *Furo do Aurá* located on the outskirts of Belém, Pará, Brazil, respecting the service system developed by the program.

For this research, were select adult women, aged over 18 years, sexually active and residents in communities assisted, between 2013 and 2014. Women under 18 years, who have not started their sexual life and pregnant women were excluded from this study. The sample size was calculated according to the population number of women in the two riverside communities. The sample was constructed according to the women who attended the inclusion criteria.

Because it was a research involving both biological material and epidemiological collection of individuals, only women who agreed to participate in the study were attended after filling up an informed consent, and receiving orientation. The research protocol was analyzed and approved by the Ethics Committee for Human Research of the Institute of Health Sciences of Federal University of Pará, in September 09th, 2008, according to the protocol number 156/08 CEP-ICS/UFGA.

To delineate the socio-epidemiological profile related to vulvovaginitis, an investigative questionnaire was applied. Women were questioned about their age, marital status, rental, number of children, sexual activity, number of sexual partners, age of their first sexual relationship, use of contraceptives, number of partners, corporal hygiene and behavior habits, as well as complaints of leucorrhea, pain, strong odors and dysuria.

Among the laboratorial tests for diagnosis of bacterial vaginosis, candidiasis and trichomoniasis, secretion collection from the vaginal sac, using sterile cotton swab and disposable speculum was performed. The gathering was carried out on the boat, by trained laboratory technician following all the semiotic protocols.

After collection procedures the smear was performed in sterile glass slides and the swab was deposited in a clear and sterile hemolysis tube, containing 5 mL of physiological solution (NaCl 0.9%). Also in the boat, fresh examination was carried out, consisting in the placement of the vaginal secretion and a drop of physiological solution between a glass slide and cover slip, which formed a suspension that was visualized with an optical microscope (40x objective lens). Bacterioscopy was performed using Gram stain and was conducted in the Clinical and Environmental Mycology Laboratory from the UFGA's School of Pharmacy. Positive results were based on: presence of "clue cells" and Gram variable bacilli in the characterization of *Gardnerella vaginalis*, presence of blastopores or pseudohyphae yeast in the vaginal secretion fresh examination was characterized as *Candida spp*; and the presence of flagellated protozoa was characterized as *Trichomonas vaginalis*.

For the statistical analysis, Fisher exact test was performed using BioEstat software, version 5.0, applied in areas of biological and medical sciences. The data were tabulated and presented in graphics and tables built with Microsoft Office Excel® program.

3. RESULTS

Within two years, the present study evaluated vaginal secretion samples from 56 women, who attended the inclusion criteria, from two Amazonian riversides communities in the city of Belém, Pará. Ages ranged from 18 to 60 years, with a mean of 35.1 (SD $\pm$ 11.6).

Among the 56 vaginal secretion samples analyzed, 44 had infectious agents: *Gardnerella vaginalis*, *Candida spp* and *Trichomonas vaginalis*. These characterize the group of positive women to vulvovaginitis, with a prevalence of 78.57% compared to women with normal microbiota.

Regarding the altered vaginal microbiota, there was a prevalence of 44.65% of *Gardnerella vaginalis*. Co-infections, which occur in the presence of two or more infectious agents, were found in 12 women of the positive group, representing 21.43%. Bacterial vaginosis and candidiasis were observed in 14.29%, vaginosis and vaginitis in 5.36% and only 1.78% of women presented all three infectious agents investigated. All women with co-infection were positive for the presence of *Gardnerella vaginalis* (Table 1).

Table 1. Distribution as a percentage of the types of pathogens, co-infections and normal microbiota found in women from Amazonian riverside communities in the city of Belém, Pará, visited in the years 2013 and 2014.

Infectious agents	n	%
<i>Gardnerella vaginalis</i>	25	44,65
<i>Candida spp</i>	6	10,71
<i>Trichomonas vaginalis</i>	1	1,78
<i>G. vaginalis. eCandidaspp</i>	8	14,29
<i>G. vaginalis. eT.vaginalis</i>	3	5,36
<i>G. vaginalis. Candidaspp e T. vaginalis</i>	1	1,78
Normal microbiota	12	21,43
Total	56	100

Within the group of women with positive results, aged 18 to 40 years, considered in the reproductive phase, there was a prevalence of 72.73% (n = 32). Only 27.27% (n = 12) represent the number of women above 41 years and the maximum age of the women seen in this study was 60 years. Table 2 shows the results of the samples, according to age group. Samples suggestive of *Gardnerella vaginalis* were identified in 54.05% in the age group of 18-40 years for positive women. Only the *Trichomonas vaginalis* was most prevalent in the age group at or above 41 years, with 80%.

Table 2. Association of age with the results found in women from Amazonian riverside communities in the city of Belém, Pará, visited in the years 2013 and 2014.

Results	Age group		Total +/n	p value
	18 – 40 +/n	> 41 +/n		
<i>G. vaginalis</i>	20/29	17/27	37/56	0.4238
<i>Candida spp</i>	9/29	6/27	15/56	0.3302
<i>T. vaginalis</i>	1/29	4/27	5/56	0.1544

76.78% (n = 43) of riverside women did not complete elementary school and only 23.21% (n = 13) completed. There was no association between study time and the presence of vulvovaginitis (p = 0.567). It was noted that 78.58% (n = 44) of women are married or in a stable relationship, 19.64% (n = 11) are unmarried and 1.78% (n = 1) are widows.

The age for sexual debut of these women ranged from 12-24 years with a mean of 14.8 (SD ± 2.22). The average number of partners was 1.8 (SD ± 1.24), varying between one and six partners, 10.71% (n = 6) reported having above four partners. Regarding the intimate hygiene 73.21% (n = 41) said they did not perform correctly and only 26.79% (n = 15) reported conducting adequate intimate hygiene. Regarding the use of contraceptive methods, 62.50% (n = 35) reported no use of a method and only 14.28% (n = 8) use condoms as contraception and prevention of sexually transmitted diseases.

Statistical significance was not found when comparing the groups (Table 3) on the association between vulvovaginitis and factors such as condom use, early sexual debut, number of partners and internal intimate hygiene.

Table 3. Gynecological history associated with vulvovaginitis of women from riverside communities in the city of Belém, Pará, visited in the years 2013 and 2014.

Gynecological history	<i>G. vaginalis</i> (n)	<i>Candida spp</i> (n)	<i>T. vaginalis</i> (n)
Condom use			
Yes	4	2	1
No	33	13	4
	p= 0.6784	p= 0.9885	p= 0.4896
Beginning of sex life			
Up to age 18	36	15	5
Above 18 years	1	0	0
	p= 1.000	p= 1.000	p= 1.000
Number of sexual partners			
1 – 3	34	15	4
4 ou mais	3	0	1
	p= 0.3971	p= 0.1769	p= 0.4387
Intimate Hygiene			
Yes	11	2	2
No	26	13	3
	p= 0.5431	p= 0.1985	p= 0.6015

Most women reported having between 2 and 3 gynecological problems, wherein 66.07% (n = 37) said having discharge, 30.35% (n = 17) reported dysuria, 28.57% (n = 14) had pruritus and only 10.71% (n = 8) had no problems. An association was found between vulvovaginitis and dysuria, strong odor and vaginosis, vaginitis and candidiasis, which is the combination of these symptoms to vulvovaginitis. Other signs and symptoms were not statistically significant and can be seen in Table 4.

Table 4. Signs and symptoms associated with vulvovaginitis in women from Amazonian riverside communities in the city of Belém, Pará, visited in the years 2013 and 2014.

Signs and symptoms	<i>G. vaginalis</i> (n)	<i>Candida spp</i> (n)	<i>T. vaginalis</i> (n)
Discharge			
Yes	27	10	5
No	10	5	0
	p= 0.1477	p= 1.000	p= 0.1547
Pruritus			
Yes	10	5	2
No	27	10	3

	p= 0.7508	p= 0.4887	p= 0.5892
Dysuria			
Yes	13	5	5
No	24	10	0
	p= 0.3644	p= 0.9999	0.0016
Strong odor			
Yes	23	9	4
No	14	6	1
	p= 0.0000	p= 0.0301	p= 0.0497
Pain			
Yes	14	3	3
No	23	12	2
	p= 0.5526	p= 0.2195	p= 0.3237

4. DISCUSSION

The prevalence of vulvovaginitis found in this study was considered high in comparison to others [17, 18, 19]. Luppi et al, (2011) found in their study in Sao Paulo found a prevalence of only 13% compared to vaginitis caused by other etiologic agents, showing that the three agents, aim of this study, are the most common causative agents of vulvovaginitis. There are other less common vulvovaginitis causes, such as atrophic vaginitis occurring by the hormone estrogen deficiency and vulvovaginitis non-infective caused by irritative or allergic contact dermatitis, which can be associated with the use of feminine hygiene products, absorbers, contraceptives, preservatives, and other causes [2, 20].

Considering the age of these women who tested positive, there is a predominance of cases in women in reproductive age. The normal vaginal microbiota in this age group is predominantly made up of a few species of lactobacilli. The metabolic products are responsible for maintaining the normal flora by inhibiting other pathogens [17]. Other studies also showed prevalence of vulvovaginitis in the age group between 18 and 40 years, similar to this research [4, 21, 22]. The possible increased susceptibility in young women may be due to biological factors such as age, hormonal changes, cervical ectopic and beyond sexual behavior of high risk, more partners and unprotected sex [23].

Women with low level of education are the most vulnerable to vulvovaginitis due to their lack of awareness on sexual safety and hygiene [24]. It is known that women living in riverside communities lack access to information and health services, which contributes to the worsening of health conditions such as infections, confirming the results presented in this study.

The prevalence of bacterial vaginosis caused by *Gardnerella vaginalis* is higher compared to candidiasis and trichomoniasis. The significant presence of the agent, including cases of co-infection, are consistent with other studies conducted in Brazil and other countries, who report *G. vaginalis* as the bacteria most commonly found in smears stained by Gram [2, 5]. The result found was higher compared to other studies of prevalence of bacterial vaginosis [24, 25]. Comparing the studies, it is observed that they were conducted in cities where women have low-income conditions; however, they had minimal access to information and could afford to pay for health services, unlike riverside women assisted by this program.

Positive results for *Candida* were similar to those found in the study by Rathod et al, (2012). However, prevalence was higher than that found in the study by Kalantari et al. (2014) [26, 27]

Regarding trichomoniasis, this population revealed a high prevalence compared to other studies. In Brazil, the prevalence of *T. vaginalis* is 3.2% in women aged between 18 and 40 years, treated in primary health care services [20]. In a survey conducted in the state of Amazonas, Brazil, the prevalence was 4.1% in patients with a mean age of 32 years-old HIV-positive patients [28]. Vijaya et al. (2003) reported in their study a 2.1% prevalence of trichomoniasis in a rural community from South India. The literature reveals a variation in the *T. vaginalis* infection prevalence, probably because of the difference in methodology used for diagnostics. The vaginal cytology has a low rate of sensitivity and specificity when compared to the direct examination under the microscope, the method used in this study, in addition to the Gram stain [29, 30].

The lack of association between the vulvovaginitis and some behavioral and sexual habits, such as number of partners, marital status, early sexual activity, intimate hygiene and condom use was unexpectedly surprising. These variables are cited in other studies as dependent associations for the presence of vulvovaginitis [20, 31].

In the present study, we evaluated the number of sexual partners over a lifetime and no statistical association was found regarding this variable. The early onset of sexual activity, under 18 years, predisposes to a higher risk of genital infections and STDs, mainly due to increased exposure [32, 33].

The condom is considered the most effective contraceptive method for the prevention of various STDs. The population studied had a low frequency condom use, a behavior that can increase the risk of contracting STDs [13, 34].

In this study, most women who tested positive for the evaluated disorders reported some clinical signs, being discharge the most prevalent one. However, this sign was not statistically associated with any infection, unlike what was reported by Gama (2011) [33]. No association between the occurrences of strong odor and the three infections was found, as well as no positive correlation for dysuria with vaginitis, corroborating other studies [20, 33]. It is known that vulvovaginitis is characterized by discharge, in particular bacterial vaginosis, which have a strong odor. Candidiasis is associated with pruritus, while trichomoniasis is associated with dysuria and pain.

The both generally and individually can be explained by several factors such as young women susceptibility and the lack of awareness by women with low education levels. Also, despite the lack of statistical correlation, high prevalence of vulvovaginitis is mainly related to risky sexual behavior and poor intimate hygiene.

4. CONCLUSION

The results showed a high prevalence of vulvovaginitis in sexually active adult women, residents from Amazonian riverside communities of *Genipaúba* and *Furo do Aurá*, assisted by “*Luz da Amazônia*” program. Among the three possible studied infections, vulvovaginitis or bacterial vaginosis had the highest prevalence, including in co-infections, followed by candidiasis.

In the present study, there was no statistically significant correlation between the vulvovaginitis and apparently important factors, such as age, education, marital status, number of sexual partners, early sex debut, condom use and personal hygiene. If undiagnosed and untreated, vulvovaginitis can result in gynecological damage.

272 The location of riverside communities of the state of Pará, built along riverbanks, makes
273 difficult for the people to have access to health services located in urban centers. Due to the
274 needs of this population and the high prevalence of vulvovaginitis found, the development of
275 extension and research projects aimed at preventing vulvovaginitis for the promotion of
276 education on women health's for those communities and stimulation of regular gynecological
277 examination must be taken into priority by the local authorities and health professionals.
278 Therefore, one of the missions of the *Luz da Amazônia* program in those communities is to
279 provide women with access to health education, care and treatment.

280 **CONSENT**

281 All authors declare that a 'written informed consent was obtained from the patient (or other
282 approved parties) for publication of this case report and accompanying images. A copy of
283 the written consent is available for review by the Editorial office/Chief Editor/Editorial Board
284 members of this journal.

286 **ETHICAL APPROVAL**

287
288 All authors hereby declare that all experiments have been examined and approved by the
289 appropriate ethics committee. The research protocol was analyzed and approved by Ethics
290 Committee for Human Research of the Institute of Health Sciences of Federal University of
291 Pará, in September 09th, 2008, according to the number protocol 156/08 CEP-ICS/UFGA.

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