



Risk factors associated with *Gardnerella vaginalis* vaginosis in women of reproductive age at the gyneco-obstetric and pediatric hospital of Yaounde Cameroon

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Abstract

Bacterial vaginosis is the most common form of genital infection and one of the most common causes of vaginal discharge in women with genital activity. The aim of this prospective and cross sectional study was to assess the prevalence of bacterial vaginosis and the risk factors associated with this infection in women of childbearing age at the Gyneco and Obstetrics and Pediatric Hospital of Yaoundé. Each vaginal swab sample collected was preceded by a questionnaire. Bacterial vaginosis was defined as a Nugent score of 7 to 10. The results were as follow: In our study we enrolled 218 women. The average age was 30.66 ± 7.08 years with extremes of 18 to 48 years. The most represented age group was that of 26-33 years (38.67%). Almost all of the women in our study were Christian (91.50%) and 6.60% were Muslim. The prevalence of bacterial vaginosis was 42.5% (90/212) with the presence of *Gardnerella vaginalis* 38.20% (81/212) and *Mobiluncus* species 2.83% (6/212). The 18-25 years old age group was more exposed to *Gardnerella vaginalis* vaginosis (38.27%). but the student group is the most infected with a rate of 32.09%, and the difference was not significant. The single group was more exposed to this vaginal infection with a prevalence of 46.91% and the difference with the others groups was statistically significant. (Tableau II). University-level women were more infected with *gardnerella vaginalis* infection with a prevalence of 58.02% followed by secondary-level women (37.03%).

Women of childbearing age are exposed to *Gardnerella vaginalis* vaginosis. One gynecological sample in women during their reproductive life is necessary in order to avoid complication related to this infection.

Keywords: bacterial vaginosis, *Gardnerella vaginalis*, women, Yaoundé, Cameroon

Introduction

Bacterial vaginosis (BV) is an infection that results from a profound imbalance in the vaginal flora: lactobacilli are replaced by *Gardnerella vaginalis* (GV), *Mobiluncus* species, anaerobic species such as *Eubacterium* sp, *Fusobacterium* ^[1].

Bacterial vaginosis is the most common form of genital infection and one of the most common causes of vaginal discharge in women with genital activity ^[2]. It is manifested by abundant leucorrhoea with the smell of rotten fish and can cause pain, itching and redness in the vagina ^[2]. It leads to many expenses amounting to millions of euros in health care ^[3]. the vaginal cavity is naturally colonized by many bacteria. Lactobacilli or Doderlein flora are the predominant bacteria in the so-called normal vaginal flora ^[4]. The disappearance of this flora exposes to bacterial vaginosis. However *Gardenerella vaginalis* is isolated with a greater frequency (83 to 98%) in the flora of bacterial vaginosis ^[5]. Estimates of the prevalence of BV worldwide range from 12% in Australian women to 29% in North America, and over 50% in women in the Middle East and South Africa ^[6]. Payne *et al.* (2020) reported a prevalence of vaginosis of 17.08% in Dschang ^[7] and Diagne *et al* found a prevalence of 21% in Senegal ^[8]. The prevalence of bacterial vaginosis was 3.13% higher in African American women than in white women ^[6]. The existence of bacterial vaginosis facilitates the acquisition of certain sexually transmitted infections such as *Neisseria gonorrhoea* infection, *chlamydia trachomatis*, herpes simplex type 2 and human immunodeficiency virus infection ^[9]. Bacterial vaginosis is a benign pathology, but it can have serious gynecological and obstetrical complications during pregnancy. Several studies have shown the potential role of BV in the occurrence of gynecological complications which include pelvic inflammation, cervicitis, HIV and cervical cancer. The obstetrical risks associated with BV include: threats of premature delivery, abortions, chorio-amnionitis and postpartum endometritis ^[10, 11, 12, 13].

The aim of our study is to assess the prevalence of bacterial vaginosis and the risk factors associated with this infection in women of childbearing age at the Gyneco and Obstetrics Hospital of Yaoundé.

Materiel et method

Type and duration of the study

It was a longitudinal and cross-sectional study, spreading over a period of three months from April to July 2021, at the Yaoundé Gyneco-Obstetric and Pediatric Hospital (HGOPY) in the Centre Region of Cameroon.

Study population and size of the study

Our study population consisted of 218 women aged 18 to 48 who came at HGOPY for consultation in the department of gynaecology, who gave informed consent to participate in the study and to whom we asked for a cervico-vaginal swab. Menopausal women and women in menstruation or on vaginal ovules or antibiotics were excluded.

The size of the population was calculated with the formula of Lorentz according the prevalence of 17.08% of bacterial vaginosis reported by Payne *et al.* (2020) [6] in their study in Dschang (Cameroon) [7].

Sample collection

Participants were asked to avoid vaginal cleansing before going for consultation. Collected samples were processed in the Laboratory of Microbiology of HGOPY.

After cleansing the vaginal margins with Dakin's solution, vaginal swabbing (at the cervix margins) was performed using specula and sterile swabs: a sterile cotton wool-tipped swab (Henso Medical, Hangan, Co, Ltd) was used to collect secretion from the vaginal walls and served to diagnose vaginal bacterial infections.

Each sample collected was preceded by a questionnaire.

Participants were interviewed face to face by trained interviewers. The information collected using the questionnaire included socio demographics information (age, marital status, education level, religion, region of origin), medical history (pregnancy, HIV-Sida), history of self-medication and recent treatments.

Diagnosis of bacterial vaginosis

For bacterial vaginosis, vaginal smears were heat-fixed and gram-stained then examined by light microscopy by a single reader and the results were interpreted by using a standardized method for diagnosing bacterial vaginosis, as described by Nugent *et al.*, (1991) [14]. Bacterial vaginosis was defined as a Nugent score of 7 to 10. Small gram negative or variable bacilli were assumed to be *Gardnerella vaginalis* morphotype and curved gram variable to be *Mobiluncus*. Sniff test was performed with potassium hydroxide solution (10%). It is positive in case of bacterial vaginosis.

Ethical considerations

We obtain an authorization of the institutional ethic committee of Yaoundé HGOPY to carry out our research. The study was submitted to the National Research Ethics Committee for Human Health (CNERSH) to obtain their approval and an ethical clearance was issued under the reference N° 2021/02/825/CE/CNERSH/SP. In addition, informed consent was obtained from patients who agreed to participate in the study.

Statistical analysis of the data

We entered the data in EXCEL software. The data collected was analysed statistically using SPSS software version 21.0. The chi square test and Fisher test were used to compare the difference in proportion between the variables. A P value <0.05 was significant.

Results

Distribution of participants according to socio demographic characteristics

In our study we enrolled 218 women, but we had six women who withdrew from the study and/or did not come for the cervico-vaginal sampling, so we worked on 212 participants. Women from all regions of Cameroon were represented. The average age was 30.66 ± 7.08 years with extremes of 18 to 48 years. The most represented age group was that of 26-33 years (38.67%). Almost all of the women in our study were Christian (91.50%) and 6.60% were Muslim.

59.4% of women had a university level, followed by those with a secondary level (33.5%). Women in concubinage were the majority (39.6%) followed by singles (31.13%) and married women (28.77%). According to professional status, 32.5% of women were civil servants, followed by women in liberal professions (25.5%), then the student-pupils group (24.5%) and housewives (17.5%). In our study, 43.4% of women were pregnant and 2.8% of women, or 6/212, were HIV-AIDS positive. The prevalence of bacterial vaginosis was 42.5% (90/212) with the presence of *Gardnerella vaginalis* 38.20% (81/212) and *Mobiluncus* species 2.83% (6/212) (Tableau I) and the coinfection of these two species was 5/212 (2.35%).

Table 1: Distribution of vaginosis according to germs

	N	%
BV (<i>Gardnerella vaginalis</i>)	81	90
BV (<i>Mobiluncus</i>)	06	06.66
BV (anaérobies spp)	03	03.33
Total	90	100

Bacterial vaginosis caused by *Gardnerella vaginalis* and risk factors**Table 2:** Distribution of bacterial vaginosis caused by *Gardnerella vaginalis* according to religion, age, professional and marital status

		Bacterial vaginosis due to GV		P value
		No (%)	Yes (%)	
Religion	Christian	119 (90.83)	75 (92.59)	0.669
	Muslim	10 (7.63%)	04 (4.93%)	
	Other	2 (1.52%)	02 (2.46)	
	Total	131 (100)	81 (100)	
Age (ans)	18-25	31 (23.66)	31 (38.27)	0.121
	26-33	57 (43.51)	25 (30.86)	
	34-41	30 (22.90)	18 (22.22)	
	42-48	13 (9.92)	07 (8.64)	
Total		131 (100)	81 (100)	
Professional status	Civil servants	45 (34.35)	24 (29.62)	0.247
	Liberal profession	35 (26.71)	19 (23.45)	
	Students	26 (19.84)	26 (32.09)	
	Housewife	25 (19.08)	12 (14.81)	
Total		131 (100)	81 (100)	
Marital status	Married	46 (35.11)	15 (18.51)	0.001
	Concubinage	56 (42.74)	28 (34.56)	
	Single	28 (21.37)	38 (46.91)	
	Widow	01 (0.76)	0 (0.0)	
Total		131 (100)	81 (100)	

Gardnerella vaginalis vaginosis was found more in Christian women with a prevalence of 92.59%. The 18-25 years old age group was more exposed to *Gardnerella vaginalis* vaginosis (38.27%) followed by the 26-33 year old age group with a prevalence of 30.86%. But the difference in prevalence between the groups age was not significant ($p= 0.121$). The different socio-professional groups are affected by *Gardnerella vaginalis* vaginosis but the student group is the most infected with a rate of 32.09%, and the difference was not significant. The single group was more exposed to this vaginal infection with a prevalence of 46.91% and the difference with the others groups was statistically significant ($p=0.001$). (Tableau II)

Table 3: Distribution of bacterial vaginosis caused by gardnerella vaginalis according to educationnal level, HIV status and among pregnant women

		Bacterial vaginosis due to GV		P value
		No (%)	Yes (%)	
Level of instruction	Without instruction	01 (0.76)	00 (0.0)	0.636
	Primary	10 (7.63)	04 (4.93)	
	Secondary	41 (31.29)	30 (37.03)	
	University	79 (60.30)	47 (58.02)	
	Total	131 (100)	81 (100)	
VIH status	Negative	129 (98.47)	77 (95.06)	0.151
	Positive	02 (1.52)	04 (4.93)	
Total		131 (100)	81 (100)	
Pregnant	Yes	65 (49.61)	28 (34.56)	0.032
	No	66 (50.38)	53 (65.43)	
Total		131 (100)	81 (100)	

University-level women were more infected with *gardnerellera vaginalis* infection with a prevalence of 58.02% followed by secondary-level women (37.03%). The difference between education levels was not significant. *Gardnerella vaginalis* vaginosis in HIV-AIDS positive women was 4.93% and women who are not pregnant suffer more from this infection (65.43%) than pregnant women (34.56%) and the difference was significant.

Discussion

Bacterial vaginosis is a fairly common infection in women of childbearing age. It is a benign pathology but can have serious gynecological and obstetrical complications during pregnancy.

Sociodemographics factors of the study population

The age of the women in our study was 18 to 48 years old with an average of 30.66±7.08 years old. A study conducted by Tamboura *et al.* (2004) at the University teaching Hospital of Ouagadougou had recruited women from the same age group as ours (18-47 years) with an average of 28.6±7.9 years (15). Another study conducted by Harmanli *et al.* (2000) in the United States had enrolled women aged 27 to 48 (16). This age group includes women who are sexually active and of childbearing age, hence their frequent consultation in hospitals. In our study, the majority of women, 92.9%, had at least secondary education, these results are similar to Mogtomo *et al.* (2016) (17) and Ketchia *et al.* (2015) in Yaoundé (18) who had the same level of education 83.7% and 79.4% respectively of women of their studies. However Keita *et al.* (2009) at the University teaching Hospital of Point G in Bamako, Mali, reports that 28% of the women in their study had secondary education (19). The high education rate in our study can be justified by the fact that at least a quarter of our study population had university level (59.4%). In our study population, 24.5% of women were students and 17.5% were housewives. Among these women, 28.77% were married and 39.6% were cohabiting, while 31.13% were single women. Bamba *et al.* (2007) had 92.0% married women and 8% single women in their study (20). We can deduce that marital status varies across cultures and countries.

The prevalence of bacterial vaginosis due to *Gardnerella vaginalis* in the study population

The prevalence of bacterial vaginosis (BV) due to *Gardnerella vaginalis* in our study was 90%. This rate proves that BV is a frequent infection in our environment. It poses a real problem for maternal and child health because of its potential role in the occurrence of gynecological and obstetrical complications. Ours results are superior to those obtained by Payne *et al.* (2020) ^[6] in Dschang (17.08%) (7) and by Diagne *et al.* (2019) in Senegal (21%) (8). On the other hand, they are also higher than those obtained by Allahna *et al.* (2016) in Malawi; 51% (21). The differences in reported prevalences in different countries could be due to environmental, behavioral, socio-economic status and the screening techniques used were different between studies.

Risk factors for bacterial vaginosis due to *Gardnerella vaginalis*

Distribution of VB to GV according to age, level of education and religion

Women aged 18 to 33 are more infected with *Gardnerella vaginalis* vaginosis; 69.13%. Our results corroborate those of Faye-Kette *et al.* (1992) in Abidjan concerning the same age group with bacterial vaginosis of 63.84% (22) and those of Tamboura *et al.* (2004) in Burkina who report a prevalence of 64.3% among women of the same age group (15). Our higher rate can be justified by the fact that at this age group, women are in full genital activity which could destroy the flora of Doderlein and expose to bacterial vaginosis. The youngest (18-25 years old) have multiple sexual partners and are sometimes adept at oral contraception and intravaginal practices. Aziz *et al.* (2019) In Yemen report that people under 25 were twice as likely to have BV (23). Regarding women infected with GV bacterial vaginosis, 95.05% had the minimum level of secondary education. The results of Tamboura *et al.* (2004) corroborate our results, they find that 64.3% of women with bacterial vaginosis had a minimum high school education (15). On the other hand, Bradshaw *et al.* (2015) report that bacterial vaginosis was associated with an education level of less than 13 years of study (24). Our result seems paradoxical, because the women in our study are educated and would certainly not apply good hygiene practices to their vaginal cavity and sometimes they inform themselves in a biased way in social networks (23). Christian women were more exposed to bacterial vaginosis due to *Gardnerella vaginalis* (92.59%) than Muslim women (4.93%), but the difference was not statistically significant. This low prevalence could be justified by behavioral differences concerning the intimate hygiene of these Muslim women.

Distribution of GV bacterial vaginosis according to professional status and marital status

In our study, the prevalence of *Gardnerella vaginalis* vaginosis was higher among students (32.09%). Faye-Kette *et al.* (1992) report a similar rate in Abidjan among students; (32%) (22), the almost same results were obtained by Tamboura *et al.* (2004) (28.6%) in Ouagadougou (15). The exposure of this group to BV would be due to frequent sexual intercourse and poor knowledge of hygiene of the vaginal cavity. In our study, single people had the highest rate of bacterial vaginosis infections (46.91%) followed by women in concubinage (34.56%). The results of the study conducted by Anagounou *et al.* (1994) corroborate ours and report a prevalence of 40% among unmarried people (25). This result can be justified by the fact that single people have multiple sexual partners and multiple sexual relations which could damage their vaginal flora and would therefore be exposed to bacterial vaginosis.

Distribution of bacterial vaginosis due to *gardnerella vaginalis* according to HIV status and pregnancy

In our study, 95.06% of women with vaginosis were HIV-negative against 4.93% of women with bacterial vaginosis due to *Gardnerella vaginalis* who were positive and HIV-positive. This result is similar to Keita *et al.* (2009) In Mali which reports that 90% of seronegative women were infected with *Gardnerella vaginalis* (19). However, some recent research suggests that bacterial vaginosis is associated with the risk of HIV-AIDS transmission (26), by weakening the vaginal mucosa, it potentiates HIV infection. We found no significant association between bacterial vaginosis due to *Gardnerella vaginalis* and HIV infection (p=0.151).

In our study, 34.56% of pregnant women suffer from bacterial vaginosis due to *Gardnerella vaginalis* against 65.43% of non-pregnant women who presented bacterial vaginosis infection and the difference was statistically

significant ($p= 0.032$). This lower prevalence of vaginosis in pregnant women can be justified by the fact that during pregnancy the woman's vaginal cavity becomes more acidic through the secretion of many hormones and the presence of a high concentration of glycogen, a nutrient substrate for lactobacilli which prevent vaginal infections. Tchelougou *et al.* (2013) in his study reports a prevalence of *Gardnerella vaginalis* vaginosis of 55.31% (27). This high prevalence of bacterial vaginosis in pregnant women in their study can be justified by the fact that the screening methods were different from ours, they went through the culture of the samples which is more sensitive.

Conclusion

Women of childbearing age (18-33 years) are exposed to *Gardnerella vaginalis* vaginosis, especially single women with a university intellectual level. This demonstrates the need to perform at least one gynecological sample in women during their reproductive life in order to avoid complication related to this infection.

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Conflict of interest

The authors declare that they have no conflict of interest

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