



Bacterial Vaginosis: Prevalence and Risk Factors among Women in Dakar, Senegal

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Bacterial vaginosis (BV) is an imbalance of the vaginal flora that most commonly affects women of childbearing age. It is characterised by discomfort due to vaginal discharge and is associated with serious complications in women. We aimed to determine the prevalence of BV and its risk factors.

Methodology: We conducted a prospective cross-sectional descriptive study in November 2020 at the Pasteur Institute of Dakar among women who were seen for vaginal sampling. We collected the following parameters: age, parity, history of infection, pregnancy and contraception. VB was diagnosed using the Amsel criteria and the Nugent score. Scoring is based on the presence of

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different bacterial morphotypes where a score ≥ 7 indicates the presence of BV, 4-6 indicates intermediate flora and 0- 3 normal flora. Analysis was performed using SPSS version 20.0.A statistically significant difference between the occurrence of bacterial vaginosis and a risk factor was retained for a p value < 0.05 .

Results: A total of 236 patients were included with a median age of 38 years. The prevalence of BV was 20.3%. It was more prevalent in women aged between [30-40 years] (28/101, 27.7%) followed by the age group [20-30 years] (13/51, 25.5%) with a statistically significant difference ($p=0.0001$). VB was more prevalent in nulliparous or primiparous women (28/118, 23.7%) and in those with no history of vaginal infections (20/83, 24.1%). Pregnant women and women without contraception were more affected with respectively (12/42, 28.6%) and (43/199, 21.6%). No relationship was found between BV and these previous potential risk factors.

Conclusion: BV is a very common condition in women of childbearing age. Its complexity motivates numerous researches in order to elucidate its real implication in the occurrence of adverse gynecological conditions.

Keywords: Bacterial vaginosis; prevalence; risk factors.

1. INTRODUCTION

Bacterial vaginosis (BV) is defined as a vaginal dysbiosis resulting in an imbalance of the vaginal flora due to an increase in anaerobic bacteria and the disappearance of lactobacilli, which are considered to be protective, and are replaced by commensal organisms: *Mobiluncus spp.*, *Gardnerella vaginalis*, *Mycoplasma hominis*, etc., which are responsible for a number of symptoms [1]. It is manifested by a grey, homogeneous, abundant, adherent and foul-smelling vaginal discharge, an increase in vaginal pH and the presence of bacteria adhering to the walls of the vaginal cells (clue-cells), which can be detected by microscopic examination of a slide of vaginal secretions [2]. It is a common condition and is thought to be the leading cause of vaginitis, ahead of vaginal *Candida spp* infections, affecting mainly young sexually active women, but can occur in the absence of sexual intercourse [3,4].

Thus, the prevalence of BV is generally estimated to be between 15 and 30%, but some studies show higher prevalences (61% in an STI clinic) or sometimes much lower (4.9% to 20% in pregnant women) [5]. However, its prevalence varies considerably according to ethnic and/or geographical origin (4-58%), with women of African origin being associated with the highest prevalence [6]. Moreover, 20-50% of women in sub-Saharan Africa suffer from bacterial vaginosis, with a predominance of sexually active women, in whom almost one-third are affected [7].

Serious consequences may be associated with an increased risk of sexually transmitted infections, including human immunodeficiency

virus, and complications of the upper genital tract especially in pregnancy with intra-amniotic infections, infections of the uterus after delivery or after abortion [8,9]. Indeed, numerous retrospective studies, mainly from the United States and Scandinavian countries, suggest an association between VB and an increased risk of preterm delivery, chorioamnionitis, premature rupture of membranes (PMR) and even first trimester abortions [10].

After several decades of research on VB, the pathophysiology and sequelae associated with VB remain poorly understood, thus accentuating the enigma that this condition represents [1,11]. It is in this context that we conducted this study to determine the prevalence of BV and to investigate potential risk factors.

2. MATERIALS AND METHODS

2.1 Type, Setting and Period of Study

This was a prospective cross-sectional study with a descriptive aim conducted in November 2020 at the Pasteur Institute in Dakar.

2.2 Study Population

- **Inclusion criteria:** the patients included were those received at the laboratory during the study period on whom a vaginal swab was taken after consent was obtained.

- **Non-inclusion criteria:** patients who did not give consent were not included.

2.3 Methods

- **Parameters studied:** we collected the following parameters: age, parity, history of vaginal infections, pregnancy and contraception.

- **Diagnosis of BV:** BV is diagnosed using the Amsel criteria and the Nugent score [12-16]. In the laboratory, a vaginal swab was taken from the ectocervix (posterior cul de sac). A Gram stain was performed on this specimen to determine the Nugent score. The scoring is based on the presence of different bacterial morphotypes where a score ≥ 7 indicates the presence of BV, 4-6 indicates intermediate flora and 0-3 indicates normal flora [12,15,17].

2.4 Statistical Analysis

Data entry was performed with Excel version 2010 and analysis with SPSS version 20.0. The Chi-square test was performed to see if there was a statistically significant difference between the occurrence of bacterial vaginosis and other risk factors. The level of significance was set at a value of $p < 0.05$.

3. RESULTS

A total of 236 patients were included with a median age of 38 years with a predominance of the age group [30-40 years] with 42.80% followed by the age groups [20-30 years], [40-50 years] with 21.60% and 6.80% respectively. The number of nulliparous or primiparous women was equal to multiparous women. The notion of using contraception and a history of infections were

reported in 15.7% and 35% respectively. We found a prevalence of BV of 20.3% (Fig. 1).

The vaginal flora of women with BV was composed of *Gardenerella vaginalis* (GV) in all cases of BV, which may be associated with *Corynebacteria* (Coryne) (29%) and/or *Mobiluncus* (Mob) (44%). We investigated potential factors that may influence the occurrence of bacterial vaginosis (Table 1). With regard to age group, BV was more common in women between the ages of [30-40 years] (28/101, 27.7%) followed by the age group [20-30 years] (13/51, 25.5%). We found a statistically significant difference ($p=0.0001$) between VB and age group. For parity, VB was more noted in nulliparous or primiparous women (28/118, 23.7%). No significant difference was observed between VB and parity ($p=0.131$). Regarding history of infection, BV occurred in women with no history (20/83, 24.1%) with no statically significant difference ($p=0.318$).

VB was more frequent in pregnant women with only (12/42, 28.6%) compared to others without any significant difference ($p=0.315$). BV was more common in women without contraception (43/199, 21.6%) compared to women on contraception (5/37, 13.5%) and no relationship was found between BV and contraception ($p=0.532$).

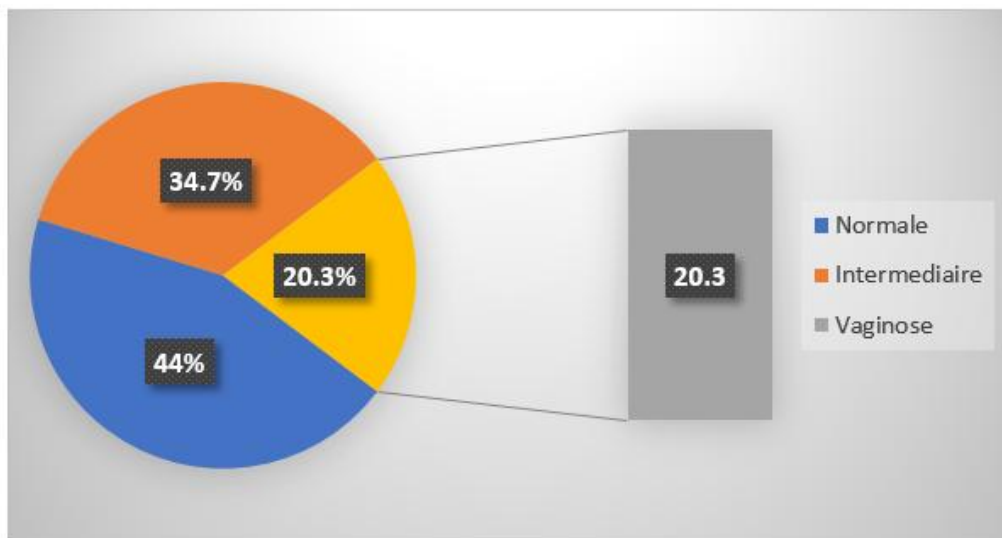


Fig. 1. Distribution of patients according to vaginal flora

Table 1. Relationship between flora type and potential risk factors

Caractéristiques	Type of flora			Total N	p-value
	Normal n (%)	Intermediate n (%)	Vaginosis n (%)		
Age groups (year)					
[20-30]	23 (45,0)	15 (29,4)	13 (25,5)	51	0,0001
[30-40]	52 (51,5)	21 (20,8)	28 (27,7)	101	
[40-50]	26 (51,0)	24 (47,0)	1 (2,0)	51	
[50-60]	2 (13,3)	10 (66,6)	3 (20,0)	15	
[60-70]	3 (18,7)	10 (62,5)	3 (18,7)	16	
[70 –80]	0 (0,0)	2 (100,0)	0 (0,0)	2	
Parity					
≤ 1	56 (47,4)	34 (28,8)	28 (23,7)	118	0,131
≥ 2	50 (42,4)	48 (40,6)	20 (17,0)	118	
History of infections					
Yes	74 (48,3)	51 (33,3)	28 (18,3)	153	0,318
No	32 (38,5)	31 (37,3)	20 (24,1)	83	
Pregnancy					
Yes	18 (42,8)	12 (28,6)	12 (28,6)	42	0,315
No	88 (45,3)	70 (36,0)	36 (18,5)	194	
Contraception					
Yes	18 (48,6)	14 (37,8)	5 (13,5)	37	0,532
No	88 (44,2)	68 (34,1)	43 (21,6)	199	
Total	106 (45,0)	82 (34,7)	48 (20,3)	236	

4. DISCUSSION

BV is a very common vaginal dysbiosis in women of childbearing age [18,19]. Then, we found a prevalence of BV of 20.3%. The prevalence observed in our study is within the prevalence range (6%-32%) documented by most studies in Africa [1,20]. Indeed, prevalences of 14.2% and 30.3% have been reported in Nigeria and Zimbabwe respectively [11]. The same is true in other geographical areas, notably Bangladesh and the United States, where prevalence was 23.2% and 29.2% respectively [21,22].

In contrast, very high prevalences have been reported in South Africa. Indeed, the prevalence of BV is higher in South East Africa than in West Africa [21,23]. A study by Myer et al. in South Africa reported that the prevalence of BV was 58.3% in 2002 [21].

Regions such as Australia and New Zealand and Western Europe have the lowest prevalence of BV. The prevalence of BV in Australia was determined to be 4.7% in 2008 [24]; a relatively low prevalence of BV was also reported in Finland for the year 2008, at 8.6% [21,25].

The literature has not yet explored factors that predict intranational and international differences

in the prevalence of BV. Cultural factors may play a role in the observed differences. In addition, there may be differences in the surveillance techniques used and BV may not be a notifiable disease in all countries. Diagnostic techniques vary according to the availability of resources. Approximately 50% of cases of BV are asymptomatic [13]. Due to variations in clinical guidelines, BV may go undetected and the actual prevalence of BV within a country and the reported prevalence would not be the same [11].

Cases of BV were more frequent among women in the (30-40) and (20-30)age groups, with 27.7% and 25.5% respectively, and a statistically significant difference ($p=0.0001$) was found. These results are in agreement with those found by some authors such as Ranjit, et al. in 2018 who found the highest number of BV cases in the 30-40 year age group (8.8%) and the lowest number of BV cases was observed in patients in the 10-20- and 50-60-year age groups (1.3%) [19]. The results of this study are also similar to those reported in the studies by Asiegbu et al. in 2018, who found the highest rate of BV (69.1%) in the 25-34 age group [20].

Indeed, BV is a condition that mainly affects sexually active young women, but can occur in the absence of sexual intercourse [4].

This is not consistent with the study by Adinma et al (Nigeria) who found a prevalence of 17.0% for 16-20 year olds [26] and Larsson (Sweden) 18-25 year olds [27].

The highest prevalence of BV has been observed in women who are not on contraception compared to women on contraception. Many studies have shown that the use of hormonal contraceptives is associated with a reduced likelihood of developing BV [19]. These studies demonstrate an association between hormonal contraceptive use and the risk of BV, and raise the role of steroid hormones in influencing the vaginal environment in order to protect against the development of BV. The association between BV and contraception varies according to the methods used. Studies have shown that combined oral contraceptives, progestin-only contraceptives and condom use protect against BV [15,19,24,27,28]. They postulated that the difference observed between women who used oral contraceptives and those who did not could be attributed to the effect of increased levels of oestrogen, which could potentially promote the growth of specific bacteria responsible for reducing the risk of BV [19]. Of note, Ranjit et al. reported that the risk of BV was higher in those who used condoms daily compared to those who sometimes used condoms, but this difference was not statistically significant. They also found that oral contraceptives reduced the risk of BV [19]. Conversely, consistent condom use has been reported in other studies to significantly reduce the risk of recurrent BV [1,27]. The relationship between BV and intrauterine devices (IUDs) is unclear [29]. Some studies have determined that IUDs increase the risk of BV [24] while others have determined that there is a reduced risk [15]. However, intravaginal bleeding in the first six months in IUD users was found to be associated with twice the risk of BV [15]. It is important to consider that there may be differences in the type of IUD used in each study (hormone-loaded versus copper-bearing IUDs). The above studies did not distinguish between the types of IUD used.

In our study, the association between vaginosis and pregnancy was found to be 28.6% and 18.5% in non-pregnant women. In Senegal, a similar prevalence (28.0%) was found by Ngom-Cisse et al [30]. In a study conducted in Lagos, Nigeria, a similar prevalence (26.0%) was observed among pregnant women by Afolabi BB et al [31]. Similarly, Gözde Işık observed a prevalence of 27.9% in Turkey [32].

Other studies have reported lower prevalences in pregnant women, notably in Nigeria and Thailand, where prevalences of 16.6% and 19.3% respectively have been found [33,34]. According to some authors, BV increases the risk of miscarriage, preterm labour, premature delivery, chorioamnionitis and postpartum complications such as endometritis [33].

VB was more frequent in nulliparous and primiparous women (23.7%). This was reported in Senegal by Ngom-Cissé who found more VB in primiparous women (31.25%) than in multiparous women (25.45%) without any statistically significant difference [30]. These results are corroborated by other studies, notably by Achondou AE et al. in 2016 in Cameroon [35] and by Konadu DG et al. in 2015 in Ghana [36].

This high rate of VB in nulliparous and uniparous women can also be attributed to the increased frequency of intercourse and douching for these women [37]. This is not in line with most authors. Indeed, the epidemiological profile of women with BV is similar to that of women with STIs: BV is significantly associated with having a recent sexual partner or multiple sexual partners [38]. In the study by Ghattargi et al, BV was more common in multiparous women with a statistically significant difference [39].

Indeed, other previous studies have reported that multiparous women are the group most affected by bacterial vaginosis [39,40]. Although multiparous women are normally more sexually active, with social change the age of first intercourse is becoming earlier and young people are engaging in more sexual activity with increasingly sophisticated methods of protection. We found a higher frequency of BV in women without a history of genital infections with no statistically significant difference.

BV is associated with severe upper genital tract sequelae. Women who are more sexually active and shower more often have more vaginal infections which leave a favorable environment for bacteria. The carriage of BV is also favoured by sexual contact with penetration, but also by digital-genital contact, which are practices that favour infections [41].

While contributing to the strengthening of biological and epidemiological knowledge about BV, our study nevertheless has some limitations. The clinical information of the patients as well as their intimate habits could help to better understand the occurrence of BV.

5. CONCLUSION

This work has allowed us to find a fairly high prevalence of BV in Senegal and to study the potential involvement of certain factors in its occurrence. Among the factors suspected in our study, only the association between age and bacterial vaginosis was found. Knowledge of the factors that contribute to BV and an understanding of its pathophysiology will help to raise women's awareness in order to limit its occurrence and avoid complications in women at risk.

CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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