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Bacterial Vaginosis and Colonization by Gardnerella Vaginalis in Pregnant Women at Mother-Child University Hospital Centre Antananarivo between 2017 And 2018

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Abstract:

Background: There was no study about bacterial vaginosis and colonization by *Gardnerella vaginalis* in pregnant women at Ambohimiandra Mother and Child Hospital Antananarivo.
Objective: To determine the prevalence of bacterial vaginosis and colonization by *Gardnerella vaginalis* in pregnant women at Ambohimiandra Mother-Child Hospital and to raise awareness about the value of bacteriological examination of vaginal secretions in pregnant women in developing countries to avoid infectious complications during pregnancy.
Materials and methods: This is an observational study conducted at Ambohimiandra Mother-Child Hospital between August 2017 and August 2018. All pregnant women carrying out a systematic bacteriological examination of vaginal sampling at the laboratory of this hospital university were included.
Results: During the study, 130 pregnant women were realized a systematic bacteriological examination of vaginal sampling. Among of these, 30.76% had bacterial vaginosis and 11.53% were colonized with *Gardnerella vaginalis*. These cases were encountered in pregnant women at the 2nd and 3rd trimester.
Conclusion: We describe the frequency of bacterial vaginosis and colonization by *Gardnerella vaginalis* during pregnancy in women with no complication at the time of sampling, finding a high frequency of bacterial vaginosis and a considerable rate of *Gardnerella vaginalis* carriage.

Keywords - Bacterial vaginosis; Gardnerella vaginalis; Infectious; Pregnancy; Antananarivo.

I. BACKGROUND

Bacterial vaginosis (BV), formerly called non-specific vaginitis, is a polymicrobial disease characterized by reduction in lactobacilli and hydrogen peroxide production, a rise in vaginal pH and overgrowth of BV associated organisms [1]. These BV associated pathogens are most frequently *Gardnerella vaginalis*. Other anaerobic pathogens are also encountered, but less frequently. It is sometimes accompanied by discharge, odor, pain, itching, or burning and is especially common during pregnancy [2]. Awareness has increased in the past few decades on the importance of bacterial vaginosis in pregnancy, and it has been discovered that pregnant women with this infection are

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at risk of adverse pregnancy outcomes. It has been associated with a significant number of obstetric and gynecological complications, such as labor and premature delivery, premature rupture of membranes, spontaneous abortion, chorioamnionitis, postpartum endometritis, incisional infection. performed at the time of cesarean section, post-surgical infections and subclinical pelvic inflammatory syndrome [3], [4], [5], [6], [7].

Other associated infections may be encountered during bacterial vaginosis including mucosal candidiasis and trichomoniasis. Mucosal candidiasis, especially vulvovaginal candidiasis (VVC), is one of the most common fungal diseases in normal healthy women [8], [9]. Pregnancy, diabetes mellitus, and antibiotic treatment are the most common predisposing factors [8], [9], [10], [11]. Vulvovaginal candidiasis has been noted to be more common in pregnancy, and pregnant women have higher rates of recurrent infections. About of trichomoniasis, *Trichomonas vaginalis*, a flagellated protozoon, is the causative agent, which is the most prevalent nonviral sexually transmitted infection worldwide with an estimated 180 million infections acquired annually [12], [13]. The pregnant women infected with this parasite may be at risk of unfavorable birth outcomes such as pre-mature rupture of membranes, premature labor, and low birth weight [2]. Trichomoniasis is associated with a 30% increase in low birth weight infants and a 30% increase in risk of preterm births [14]. These infections when present in the pregnant woman put her and her unborn child at risk if not detected and adequately treated.

No data on bacterial vaginosis and infections associated with this imbalance are available for this university hospital Centre. This study was therefore conducted to determine the prevalence of bacterial vaginosis and colonization by *Gardnerella vaginalis* in pregnant women at Ambohimiandra Mother-Child Hospital and raise awareness about the value of bacteriological examination of vaginal secretions in pregnant women in developing countries to avoid infectious complications during pregnancy.

II. Material and Methods

The study was carried out in Mother-Child University Teaching Hospital, Ambohimiandra, in Antananarivo (Madagascar). This was a descriptive, observational non interventional, study carried out in a twelve month period from August 2017 to August 2018. Patients register were explored and studied.

Study participants comprised all pregnant women carrying out a systematic bacteriological examination of vaginal sampling at the laboratory of University Teaching Hospital after visiting the obstetric and gynecological units attending antenatal care. Women who were bleeding, had inserted some drugs in the vagina were excluded from this study.

The specimens were collected with sterile dry swab following standard procedures in the laboratory of the Hospital Centre. Samples are immediately seeded on fresh blood agar 5% incubated at 37°C in a normal atmosphere for all germs, cooked blood agar incubated at 37°C anaerobically for *Streptococcus* and anaerobic germs, and on Sabouraud dextrose agar for isolation and identification of *Candida spp*. All specimens collected were examined on saline wet mounts for *T. vaginalis* and yeast cells by direct microscopy. An assessment of bacterial vaginosis was made using the Nugent's scoring system **[15]** as shown in **Table 1** and whose interpretation is found in **Table 2**. Positive cultures for *Gardnerella vaginalis* with Nugent score greater than 7 were defined as bacterial vaginosis. Positive cultures for *Gardnerella vaginalis* with Nugent score strictly less than 7 were defined as colonization.

As it is a state of the art about bacterial vaginosis and colonization by *Gardnerella vaginalis* in pregnant women who have come to systematic prenatal care, the parameters studied were the age of the parturient, the term of pregnancy, the presence and appearance of leucorrhea, the leucocyte count, the Nugent score, the prevalence of colonization by *Gardnerella vaginalis,* and bacterial vaginosis, other germs associated with *Gardnerella vaginalis.*

Data analysis was done using the Microsoft Excel 2013 and EPI INFO v.7. Descriptive statistics such as percentages, ratios, and frequency tables were used to summarize our findings. Fisher's exact test was used to compare proportions in different groups. Statistical significance was set at $p < 0.05$.

No ethical clearance was demanded because of the character retrospective of this study.

Table 1: Nugent scoring system

Organism Morphotype (number) (immersion objective x100)	**>30**	**6-30**	**1 à 5**	**< 1**	**0**
Lactobacilli-like (parallel sided, gram positive rods)	**4**	**3**	**2**	**1**	**0**
Gardnerella-like (tiny, gram variable coccobacilli and pleomorphic rods with vacuole)	**0**	**1**	**2**	**3**	**4**
Mobilincus-like (curved, gram negative rods)	**2**	**2**	**1**	**1**	**0**

Table 2: Classification of the scores

Score	**Group**
0–3 points	Normal
4–6 points	Intermediate
7–10 points	Bacterial vaginosis

III. RESULTS

A total of forty four and one hundred (n = 140) vaginal swabs samples were collected during the period. Among of these, thirty and one hundred (n = 130) were collected from pregnant women within the age range of 17–42 years and with a mean age of 29.5 years. There were 40 cases (30.76%) of vaginal infections and 15 cases (11.53%) of colonization by *Gardnerella vaginalis* among these women.

Bacterial vaginosis were very common among the young age group less than twenty nine ages and also in the third trimester **(Table 3).** Among pregnant women who have *Gardnerella vaginalis* positive culture, 70% of young people between 19 and 24 years had bacterial vaginosis according to the Nugent scoring system and respectively 63.12 % and 78.26% were in 2nd and 3rd trimester **(Table 4).** Among pregnant women who have bacterial vaginosis, there were nineteen women (45.45%) with bacterial vaginosis only. nineteen pregnant women (45.45%) had bacterial vaginosis and vaginitis by *Candida albicans*, two (5%) had both bacterial vaginosis and trichomoniasis **(Figure 1)**. None *Streptococcus agalactiae* were isolated in this study.

Table 3: Distribution of bacterial vaginosis and colonization by Gardnerella vaginalis on all pregnant women

	No of pregnant women	**Bacterial vaginosis**	**Colonization**
	No (%)	**No (%)**	**No (%)**
Age group			
[15-19[	13 (10)	4 (30.77)	4 (30.77)
[19-24[	59 (45.38)	18 (30.51)	7 (11.86)

[25-29[	25 (19.23)	8 (32)	3 (12)
[29-34[	26 (20)	8 (30.77)	0
[34-39[	4 (3.07)	1 (25)	1 (25)
[39-44[	3 (2.30)	1 (33.33)	0
Trimester			
1st	20 (15.38)	8 (40)	2 (10)
2nd	51 (39.23)	12 (23.53)	7 (13.72)
3rd	45 (34.61)	18 (40)	5 (11.11)
Unknown	14 (10.77)	2 (14.28)	1 (7.14)
Total	**130 (100)**	**40 (30.76)**	**15 (11.53)**

Table 4: Distribution of bacterial vaginosis and colonization by Gardnerella vaginalis on pregnant women with Gardnerella vaginalis positive culture

	Positive culture	***Bacterial vaginosis by Gardnerella vaginalis***	***Colonization by Gardnerella vaginalis***
	No (%)	**No (%)**	**No (%)**
Age group			
[15-19[	8 (6.15)	4 (50)	4 (50)
[19-24[	25 (19.23)	18 (72)	7 (28)
[25-29[	11 (8.46)	8 (72.73)	3 (27.27)
[29-34[	8 (6.15)	8 (100)	0
[34-39[	2 (1.53)	1 (50)	1 (50)
[39-44[	1 (0.76)	1 (100)	0
Trimester			
1st	10 (7.69)	8 (80)	2 (20)
2nd	19 (14.61)	12 (63.12)	7 (36.84)
3rd	23 (17.69)	18 (78.26)	5 (21.74)
Unknown	3 (2.30)	2 (66.67)	1 (33.33)
Total	**55 (100)**	**40 (72.72)**	**15 (11.53)**

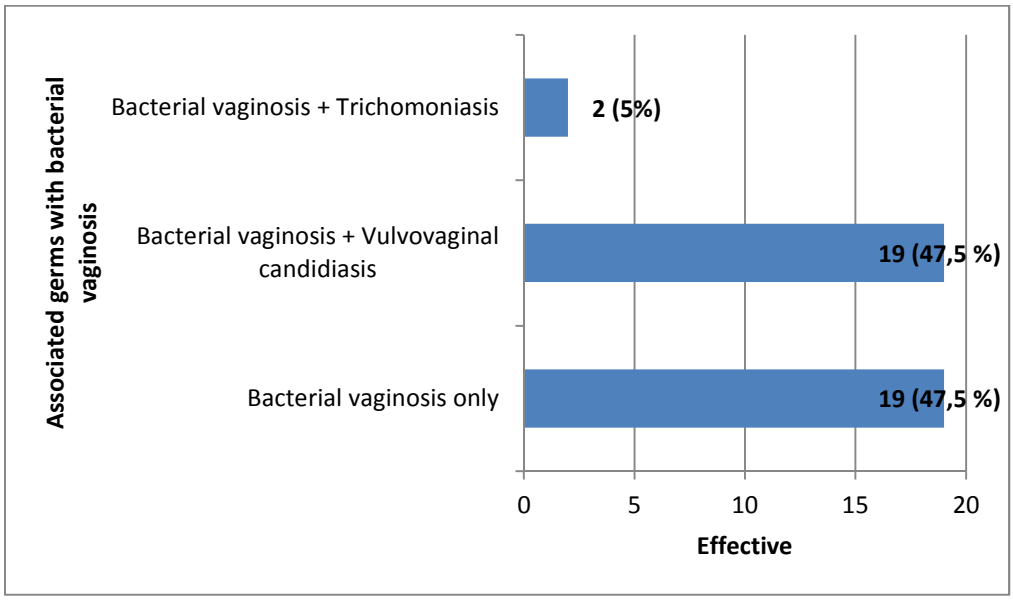

Figure 1: Association of bacterial vaginosis with others vaginal infections among pregnant women

There was no difference statistically between bacterial vaginosis and colonization depending on the abundance of leucorrhoea (p=0.7), the color of leucorrhea (p=0.6), the aspect of leucorrhea (p=0.09), the smell of leucorrhea (p=0.19), the rate of leukocyte (p=0.8).

About the characters normal or abnormal of the leucorrhea, bacterial vaginosis have no difference with colonization by *Gardnerella vaginalis* (**Table 5).** There's no significative difference statistically (RR = 0.8, IC95%= 0.2544 - 2.5156, p=0.4).

Table 5: Characters of the leucorrhea

Leucorrhea	**Bacterial vaginosis by *Gardnerella vaginalis***	**Colonization by *Gardnerella vaginalis***	**P value**
Abundance	**No (%)**	**No (%)**	**0.7**
Very abundant	12 (75)	4 (25)	
Abundant	16 (66.67)	8 (33.33)	
Scanty	10 (76.92)	3 (23.08)	
Quit abundant	2 (100)	0	
Aspect			**0.09**
Creamy	33 (73.33)	12 (26.67)	
Curds	5 (83.33)	1 (16.67)	
Milky	2 (100)	0	
Glairy	0	2 (100)	
Smell			**0.19**
Odorless	37 (75.51)	12 (24.49)	
Malodorous	3 (50)	3 (50)	

Color			**0.6**
Whitish	31 (70.45)	13 (29.55)	
Yellowish	8 (80)	2 (20)	
Greenish	1 (100)	0	

IV. Discussion

This is the first epidemiological study conducted in the Mother-Child Hospital Centre at Ambohimiandra (Antananarivo) with the aim to determine frequency of bacterial vaginosis and colonization by *Gardnerella vaginalis* among pregnant women. This study was found that there's high frequency of bacterial vaginosis in these pregnant women particularly in young people. Bacterial vaginosis was found in 40 (30.76%) of pregnant women and colonization by *Gardnerella vaginalis* in 15 (11.53%) which is in according with many studies. Bacterial vaginosis appears to be particularly common in Sub-Saharan Africa where several studies have reported high prevalence rates, ranging 21–52% among pregnant women attending antenatal clinic [16]. These are very much higher than the rates reported from industrialised countries with 13% in the United Kingdom, 11% in London and 15–30% in the United States [16] but lower cases was encountered in other studies [17]. Some have advocated routine screening of all pregnant women for bacterial vaginosis based on paucity of predictive factors and the high risk of untreated infection affecting the fetus.

About age, there's a study that found a bacterial vaginosis prevalence of 3.54% (38/1073) with the majority of bacterial vaginosis cases belonging to the age group of 21–30 years [17] which is in agreement with our findings because in our study, bacterial vaginosis is frequent between 19 – 29 years.

Contrasting with our findings, others studies found a very low prevalence of bacterial vaginosis (3.88%) and high (67.48%) *Gardnerella vaginalis* colonization rate [18]. These differences might be the result of significant different populations at study.

In fact, recent genomic studies described that vaginal microbiome in pregnancy is unique and distinct of the non-pregnant women [19], [20]. The observation that *Gardnerella vaginalis* colonization is not sufficient to cause bacterial vaginosis, is not new [21], [22]. However, recent genomic studies have highlighted that *Gardnerella vaginalis* found in healthy women have distinct genetic profiles than isolates from women with bacterial vaginosis.

Contribution of direct bacteriologic examination to the diagnosis of bacterial vaginosis during pregnancy is confirmed in this study because most of pregnant women who have bacterial vaginosis have a normal-looking leucorrhea. However, the result is not statistically significant. The Nugent's method has been extensively validated in industrialized countries where assessment of vaginal microflora is an important step in understanding the pattern of flora association with bacterial vaginosis. Culture is the least accurate in making a diagnosis of bacterial vaginosis as there is overgrowth of many vaginal organisms in this condition [16]. Though virtually, all patients with bacterial vaginosis have *Gardnerella vaginalis* isolated on culture, it must also be noted that the organism can also be cultured in 40–50% of women with normal flora [16].

In developed country and in our establishment, bacteriological examination of vaginal secretion in pregnant women is still not systematic during pregnancy but it can be used to prevent infectious complications in mother and child.

V. Conclusion

Bacterial vaginosis and *Gardnerella vaginalis* prevalence among pregnant women in the Mother-Child hospital center at Antananarivo were determined for the first time. We found that bacterial vaginosis frequency was high in our study participant but *Gardnerella vaginalis* colonization was low in contrast of other studies. Due to the small sample size and the retrospective characters of this study, associations between bacterial vaginosis and potential risk factors should be made with caution and as such, further studies involving a large number of participants and multicentric study should be performed in the future, to confirm our observations.

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