Sazonal frequency of Bacterial vaginosis and *Candida* sp in Pap smears observed in a private laboratory in Fortaleza, Brazil, from 2012 to 2015

Frequência sazonal de vaginose bacteriana e Candida sp em esfregaços citológicos de laboratório privado na cidade de Fortaleza entre 2012 e 2015

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ABSTRACT

Introduction: The most frequent gynecological complaints are associated with genital infections, which affect the vaginal microbiota, *i.e*., vaginitis and vaginosis. Bacterial vaginosis (BV) is characterized by a change of the vaginal microbiota from aerobic bacteria to anaerobic bacteria. Vulvovaginal candidiasis (VVC) is a disorder caused by the abnormal growth of yeast type fungi in the mucosa of the female genital tract. **Objective:** To identify the frequency of BV and *Candida sp* in Pap (Papanicolaou) smears in a city of Northeastern Brazil, according to the months of the year for a period of four years. **Methods:** Study of the frequency of the identification of BV and *Candida sp* in the oncotic cytology tests carried out in the Professor Eleutério Laboratory database in the city of Fortaleza from 2012 to 2015. **Results:** The average age of the evaluated cases was 34.7 years, varying from 14 to 54 years of age. In 2012, August was the month with a higher frequency of BV (62.96%), and the month of March had the highest frequency of *Candida sp* (42.35%). In 2013, BV was more prevalent in September (61.98%) and *Candida sp* in August (47.26%). In 2014, however, the month of June showed most often BV (60.47%) and September had a higher frequency of *Candida sp* (43.30%). In 2015, it was April the month in which BV was most detected (60.30%), and in June, *Candida sp* (41.85%). **Conclusion:** The frequency of bacterial vaginosis was higher than that of *Candida sp* during four years. The months with the highest frequency of identified pathogens were June, August and September; however, there were no major changes throughout the year.

Keywords: seasons; vaginitis; vaginosis, bacterial; *Candida*.

RESUMO

Introdução: As mais frequentes queixas ginecológicas estão associadas a infecções genitais, que afetam a microbiota vaginal, ou seja, vaginites e vaginoses. A vaginose bacteriana (VB) é caracterizada por uma mudança da microbiota vaginal de bactérias aeróbias para anaeróbias. Já a candidíase vulvovaginal (CVV) é um distúrbio ocasionado pelo crescimento anormal de fungos do tipo leveduras na mucosa do trato genital feminino. **Objetivo:** Identificar a frequência de VB e *Candida sp* em exames citológicos (Papanicolaou) em uma cidade no nordeste do Brasil, conforme os meses do ano em um período de quatro anos. **Métodos:** Estudo de frequência da identificação de VB e *Candida sp* em exames de citologia oncótica do banco de dados do Laboratório Professor Eleutério em Fortaleza entre os anos de 2012 e 2015. **Resultados:** Os casos avaliados tinham entre 14 e 54 anos, média de 34,7 anos. Em 2012, o mês de agosto teve maior frequência de VB (62,96%), e o mês de março teve a maior frequência de *Candida sp* (42,35%). No ano de 2013, VB foi mais prevalente em setembro (61,98%) e *Candida sp* em agosto (47,26%). Já em 2014, o mês de junho teve maior frequência VB (60,47%), e setembro maior frequência de *Candida sp* (43,30%). Em 2015, foi abril o mês em que mais se detectou VB (60,30%) e em junho, *Candida sp* (41,85%). **Conclusão:** A frequência de VB foi maior que a de *Candida sp* nos quatro anos. Os meses com maior frequência de patógenos identificados foram os de junho, agosto e setembro, no entanto não houve grandes modificações entre a distribuição durante todo o ano.

Palavras-chave: sazonalidade; vaginite; vaginose bacteriana; *Candida*.

INTRODUCTION

The most frequent gynecological complaints are associated with genital infections, most of them affecting the vaginal microbiota, *i.e*., vaginitis and vaginoses. Bacterial vaginosis (BV) and vulvovaginal candidiasis (VVC) are the most common causes of them, as microorganisms can grow beyond normal for several reasons and cause signs and indications suggesting the respective symptoms[1].

BV is the most common cause of vaginal discharge among women in reproductive age and it is classified as a change in the local vaginal microbiota from aerobic to anaerobic bacteria[2]. For some reason yet not well understood, a complex change in the vaginal microenvironment, resulting from modifications that reduce the vaginal concentration of *Lactobacillus* producing hydrogen peroxide, may allow the prevailing colonization of the anaerobic *Gardnerella vaginalis*, *Mycoplasma hominis* and *Lactobacillus* not producers of hydrogen peroxide[3-5]. The etiology is not quite understood, but maybe different factors are associated with the development of BV[6]. The main factors explained are behavioral, such as the frequency of intercourse, douches and smoking, increasing the risk of infection[7,8].

Fifty percent of women with BV are clinically asymptomatic[9]. The symptom is usually a fine, smooth, whitish discharge, with the

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smell of rotten fish[10]. It may compromise the function of the vulvovaginal barrier, increasing the susceptibility and transmissibility of sexually transmitted infections (STI), including HIV[11].

Furthermore, as already demonstrated, vaginosis can be associated with some gynecological complications, such as pelvic inflammatory disease, pelvic abscess and infection post hysterectomy. One of the most important clinical aspects of BV is its association with preterm labor, premature amniorrhexis and intra-amniotic infection, potentially compromising the perinatal prognosis[12-17].

Another common cause of discharge is the VVC, a disorder caused by the abnormal growth of the yeast type fungi (*Candida sp*) in the mucosal lining of the female genital tract. VCC is one of the most frequent diagnoses in the daily practice in Gynecology, and its incidence has increased drastically, making it the second most frequent genital infection in the United States and in Brazil. The VCC represents 20.00 to 25.00% of infectious origin discharges, only preceded by the BV[18].

This infection is characterized by itching, burning sensation, dyspareunia and elimination of a vaginal clumpy discharge, similar to skim milk. Frequently, vulva and vagina are swollen and hyperemic, sometimes associated with pain and burning sensation when urinating[19].

Some factors are admittedly associated with immunosuppressive diseases such as VVC, diabetes, pregnancy, chronic use of corticosteroids, use of antibiotics, estrogen therapy, minor traumas (for example, intercourse, habit of wearing clothes too tight or synthetic fibers) in addition to very acidic diet[20,21].

Would climate be an important factor? There is a suggestion that cases of *Candida sp* can increase in warmer periods, although not properly documented.

The city of Fortaleza, in the State of Ceará, is located in the Northeast Region of Brazil. There the temperature varies very little throughout the year; however, there's a period of more intense heat and humidity, named rainy season. In Ceará, the most significant rains begin in December and can remain until June or July, depending on the operating oceanic and atmospheric conditions[22]. Temperatures are higher from December to February[23].

OBJECTIVE

Identify the diagnosis frequency of BV and *Candida sp* in cytological tests (Papanicolaou) in a private lab of a city in Northeastern Brazil related to the months of the year in a four-year period in order to observe changes in the frequency of these cytological diagnoses during the warmer period.

METHODS

Study of the identification frequency of BV (>20.00% of clue cells) and *Candida sp* morphotypes in cervicovaginal smears in cancer prevention.

All non-specific inflammatory and specific results from 2012 to 2015 were surveyed in the Professor Eleutério Laboratory databases, which is a laboratory that receives several private clinics tests of middle and upper classes people in the city of Fortaleza, Brazil. The results were analyzed month-to-month to identify some kind of seasonality, particularly related to BV symptoms and *Candida sp* presence.

RESULTS

Between 2012 and 2015, 69,606 oncotic cytology results were studied. The population consisted in women with an average age of 34.7 years, ranging from 14 to 54 years old. It was possible to identify some type of microorganism in about 15.00% of them. When microbiology was analysed, it was possible to observe a higher frequency of *Gardnerella vaginalis* (suggesting BV) among the specific pictures, every month, occurring 58.00% in 2012, 55.00% in 2013 and 2014, and 56.00% in 2015. *Candida sp*, on the other hand, was less frequent, but still significant, from 36.00% in 2012, 2013, and 2014, respectively, to 38.00% in 2015 (**Figure 1**).

Considering the months of the year, in 2012, August showed a major BV incidence (62.96%), and March a major *Candida sp* incidence (42.35%) (**Figure 2**).

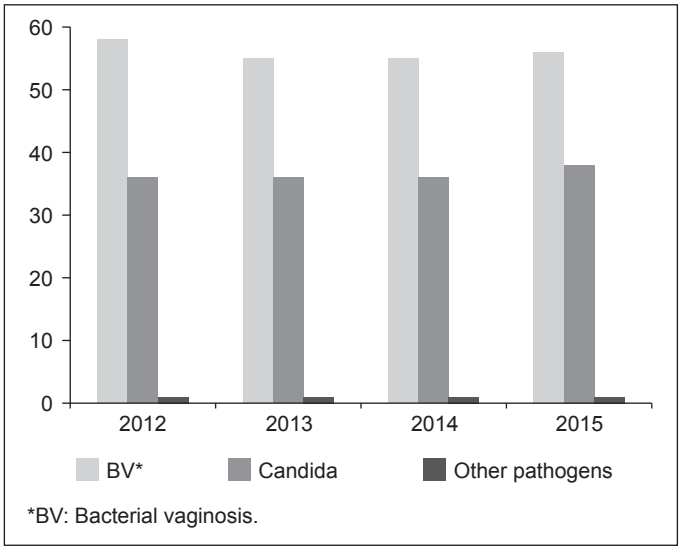

Figure 1 – Identification of bacterial vaginosis, *Candida sp*. morphotype and other microorganisms from 2012 to 2015 in a private lab in Fortaleza, Brasil.

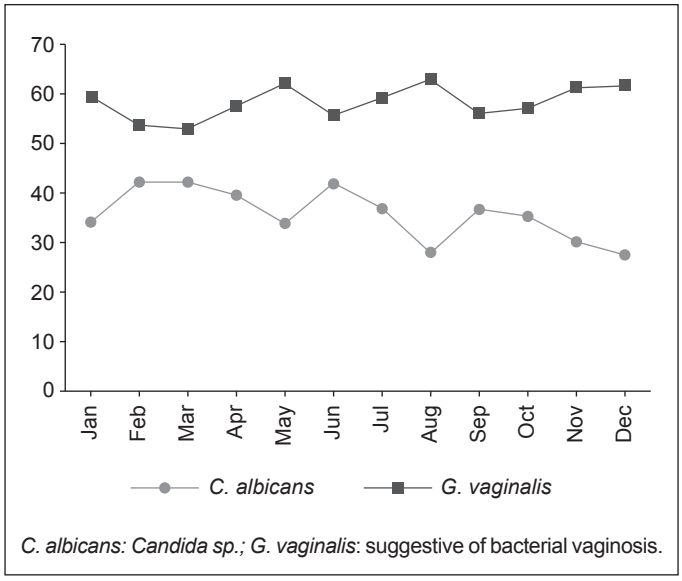

Figure 2 – Identification of bacterial vaginosis and *Candida sp*. morphotype from January to December 2012 in a private lab in Fortaleza, Brasil.

In 2013, the highest incidence of *Gardnerella vaginalis* occurred in September (61.98%), and *Candida sp* in August (47.26%) (**Figure 3**).

In 2014, however, June showed a higher incidence of *Gardnerella vaginalis* (60.47%) and September a higher incidence of *Candida sp* (43.30%) (**Figure 4**).

In 2015, *Gardnerella vaginalis* was more registered in April (60.30%), while *Candida sp* in June (41.85%) (**Figure 5**).

DISCUSSION

Mark et al.[6] analyzed 2,337 low-income and overweight to obese African-American women in every season of the year. The prevalence of BV was as follows: 40.00% in winter, 38.00% in spring, and 41.00% in summer and autumn. The season was not associated with BV in women who presented negative tests at the beginning of the study (*odds ratio versus* winter were the following: 1.0 for spring, 1.0 for summer and 0.9 for fall; p=0.81).

Among women with positive tests at the beginning of the study, the corresponding *odds ratio* observed was 0.9, 1.4 and 1.4 (p<0.001)[6]. According to the results mentioned above, the 69,609 oncotic cytology tests carried out from 2012 to 2015 showed no link between the seasons and the BV incidence.

In 2012, the highest incidence prevailed in the less hot and dry months, which correspond to the winter season in the Northeast of Brazil, reaching the peak of incidence in August, with 62.96%. In 2015, the highest incidence was observed in April (60.30%), which is characteristically a hot and humid climate, corresponding to summer in the Northeast. The variations are not of great importance and, therefore, as seen by Mark et al.[6], there was no association between season and emergence of BV.

Raso and Tarufi[24] studied the incidence of pathogens in 100,000 consecutive routine Pap tests, sent to the Pathology Laboratory Tafuri, in the city of Belo Horizonte, State of Minas Gerais. From 1984 to 1989, 12,475 (12.47%) pseudohyphae and/or spores shape cases were found. The annual incidence ranged from 5.95% (1986) to 15.18% (1988). Most of them occurred in autumn (27.80%) and less incidence in the summer (20.32%)[24]. However, Faria et al.[25], during the evaluation of medical files of patients attended in the Sexually Transmitted Diseases Department of the *Universidade Federal Fluminense* for a period of 12 years, considered that there was no increase in the diagnosis of VVC during the summer. The study shows some limitations as it is a retrospective work that considers the oncotic cytology as a diagnosis method of the symptoms, which is not the gold standard for diagnosis. Other vaginitis, such as trichomoniasis, were not studied due to the extremely low number of observed cases. However, perhaps less sensitive, it is a method quite used in Brazil and in developing countries, and this work reflects the real day-to-day situation of gynecologists. Unfortunately, there are only

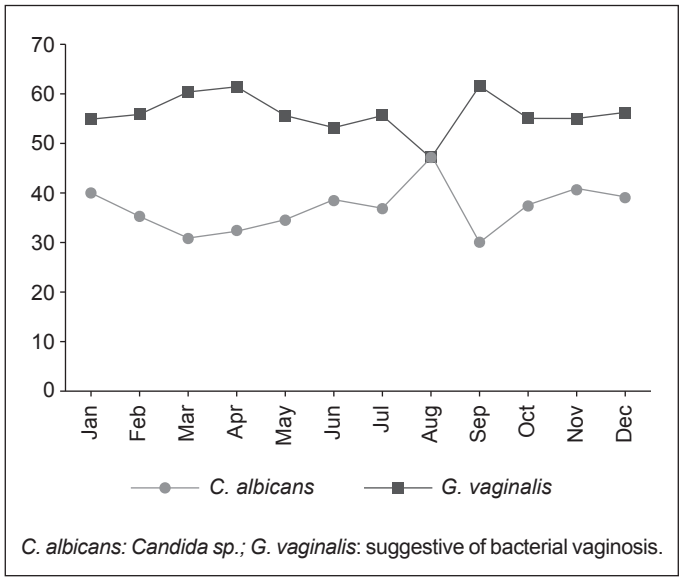

Figure 3 – Identification of bacterial vaginosis and *Candida sp.* morphotype from January to December 2013 in a private lab in Fortaleza, Brasil.

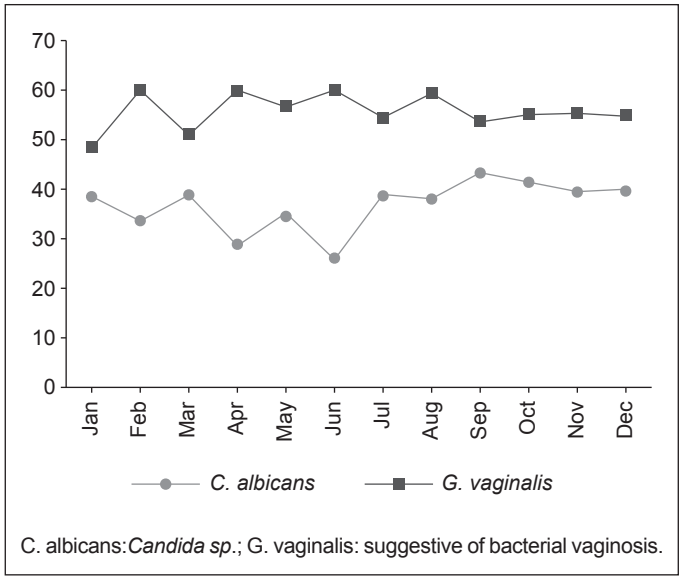

Figure 4 – Identification of bacterial vaginosis and *Candida sp.* morphotype from January to December 2014 in a private lab in Fortaleza, Brasil.

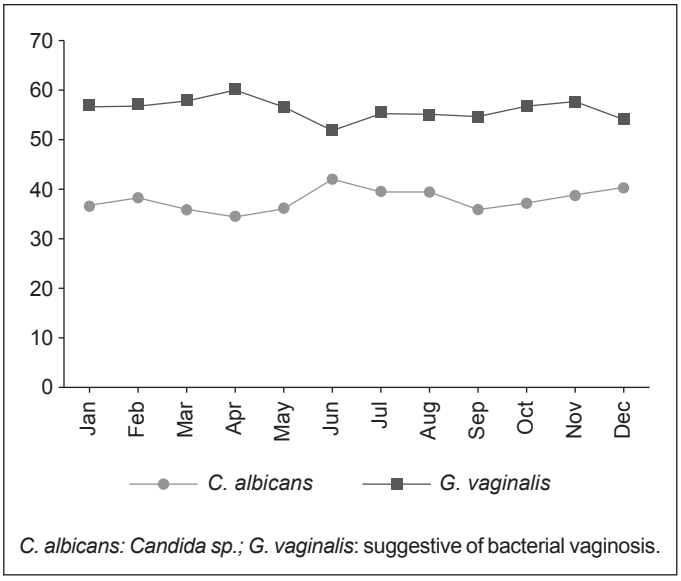

Figure 5 – Identification of bacterial vaginosis and *Candida sp.* morphotype from January to December 2015 in a private lab in Fortaleza, Brasil.

a few studies analyzing the influence of climate on the frequency of vaginal inflammatory symptoms allowing a wider discussion.

CONCLUSION

The frequency of BV results in oncologic colpocytology is greater than that of *Candida sp* during every month of the four years. The months with the highest frequency of pathogens identified were June, August and September; however, there was no significant change throughout the year, strengthened in regions where the four seasons are not explicit, as occurs in northeastern Brazil. Thus, the climate seems to have not much influence on the frequency of diagnoses in oncotic cytology of BV and *Candida sp*.

Conflict of interests

The authors declare no conflict of interests.

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