

# Profile and Susceptibility to Vaginal Yeast of Women Met on a Gynecology Outpatient Clinic

ORIGINAL

Kévia Katiúcia Santos Bezerra<sup>1</sup>, Maria do Carmo Andrade Duarte de Farias<sup>1</sup>, Anne Milane Formiga Bezerra<sup>2</sup>, Patrício Borges Maracajá<sup>3</sup>, Alfredina dos Santos Araújo<sup>3</sup>, Rosilene Agra da Silva<sup>3</sup>, Antônio Fernandes Filho<sup>1</sup>, Francisco Alírio da Silva<sup>1</sup>, Cláudia Sarmiento Gadelha<sup>1</sup>, Wilma Kátia Trigueiro Bezerra<sup>4</sup>, Anderson Amaro dos Santos<sup>5</sup>, Luiz Carlos de Abreu<sup>6</sup>

## Abstract

**Introduction:** The species of the genus *Candida* are part of the microbiota of mucosal surfaces of the gastrointestinal tract and genital, healthy. In favorable conditions can proliferate and unleash infectious processes, such as vulvovaginal candidiasis (VVC), and even oropharyngeal and systemic infections.

**Objective:** Tracing the profile of women met on a gynecology outpatient clinic of a city of the remote hinterland of Paraíba and identifying the presence of possible risk factors for vaginal candidiasis.

**Method:** The study is of exploratory, descriptive, quantitative type, conducted at the Health Center Frei Damião, Patos-PB, having as data source a structured guide to characterizing the socioeconomic profile and possible risk factors for candidiasis in patients symptomatic and asymptomatic. A speculating gynecological examination was conducted to collect vaginal secretion, and subsequently, verify the presence of *Candida* by culture in Sabouraud Agar. In the data process was used the Statistical Package for the Social Sciences-SPSS, in order to provide the descriptive statistics and analytical, applying the Chi-square test ( $X^2$ ) and the Fisher Exact Test. The research was approved by the Research Ethics Committee of the Federal University of Campina Grande, CAAE 35203614.8.0000.5575.

**Results:** The average age of the women interviewed was of 38 ( $\pm$  14.045). The results showed statistical dependence between age and schooling ( $p < 0.001$ ), age and the number of pregnancies ( $p < 0.001$ ), the number of births ( $p < 0.001$ ) and sexual activity ( $p = 0.001$ ); re-

- 1 Academic Unit of Life Sciences, Teacher training center, Federal University of Campina Grande. Cajazeiras, Paraíba, Brazil.
- 2 Nurse in a Mobile Emergency Service, MSU, Sousa, PB, Brazil.
- 3 Federal University of Campina Grande. Graduate-degree in Agroindustrial Systems, Pombal, PB, Brazil.
- 4 Nurse in a Mobile Emergency Service, MSU, Paulista, PB, Brazil.
- 5 Student of Medicine, Academic Unit of Life Sciences, Federal University of Campina Grande. Cajazeiras, Paraíba, Brazil.
- 6 Scientific Writing Laboratories, Faculty of Medicine of ABC, Santo Andre, SP, Brazil.

## Contact information:

### Maria do Carmo Andrade Duarte de Farias.

Academic Unit of Life Sciences, Teacher training center, Federal University of Campina Grande.

**Address:** Federal University of Campina Grande. Rua Sérgio Moreira de Figueiredo, sn Bairro Casas Populares, Cajazeiras, PB CEP 58900-000.

✉ carmo.andrade@ufcg.edu.br

garding the history of candidiasis 47.4% of women reported episode last year; the presence of *Candida sp* was verified in 46.2% of participants; regarding the risk factors there was statistical dependence ( $p= 0.029$ ) in relation to the previous use of antibiotic, characteristic of the menstrual cycle ( $p= 0.002$ ) and the presence of stress ( $p= 0.003$ ); the latter, in relation to the negative culture.

**Conclusion:** By the fact that this infection is considered a public health problem, it becomes relevant that working professionals in this area stay updated regarding the pathogenesis of VVC, for the appropriate handling of this infection.

#### Keywords

Candida; Vulvovaginitis;  
Microbiota; Risk factors.

## Introduction

Infections caused by *Candida* yeasts are called candidiasis or thrush, which show a broad spectrum of clinical presentations, which, depending on the affected site, are classified as superficial, with cutaneous and mucosal involvement, even deep infections, disseminated, high gravity, like the candidemia in immunocompromised patients [1].

Candidiasis can occur as a result of disruption of the host-parasite balance, triggered by changes in tissue barrier and the indigenous microbiota and commitment natural defenses, the immune [2]. Therefore, the use of broad spectrum antibiotics makes these patients more prone to infection by these yeasts. There are such cases, suppression of the indigenous bacterial flora, allowing greater proliferation of *Candida* species [3-4].

Vulvovaginitis is an inflammatory process that affects the vulva, vagina and cervix, in most often causes infectious caused by bacteria, fungi, protozoa and viruses [5]. Stressing the occurrence of mycotic vulvovaginitis caused by yeast-like fungi, not always the species of the genus *Candida* [6].

The flora is complex and its composition varies according to a number of circumstances, such as hormonal status, number of partners, use of oral contraceptives, antibiotics, diabetes, condoms,

smoking and intimate hygiene [7]. Under normal conditions, it is rich in *Lactobacilli* which produce hydrogen peroxide, which production is stimulated by estrogens. This mechanism makes the acidic vaginal pH ranging between 3.5 and 4.5 exerting a protective effect, limiting the growth of potentially harmful microorganisms. However, *Candida* is an exception because it thrives in acidic environment [8-9].

Yeasts are carried to the vagina through auto transmission process, from the perianal region and sourced from microbiota of the gastrointestinal tract or the exchange with the partner through sexual intercourse [10-11]. However, these organisms tend to remain housed in the vaginal mucosa and colonize only as once finding appropriate conditions to accelerate the process of multiplication and express virulence factors, culminating in the mucosa invasion and causing the Vulvovaginal Candidiasis (VVC) symptomatic [12].

The VVC is surely one of the most common diagnoses in daily gynecological practice, and became the second most frequent cause of genital infection in Brazil and in Europe, ranks first, accounting for 20-25% of vaginal discharge of an infectious nature, and lower in frequency only for bacterial vaginosis [10, 13].

The multiplication of *Candida* in vaginal canal is favored by a number of predisposing factors. Some situations are related to the host, prior to colonization by yeast, decreased immune response observed in immunosuppressive diseases, diabetes mellitus, pregnancy and chronic corticosteroid users. Other factors may also contribute, such as the use of antibiotics, estrogen therapy, oral contraceptives [9, 14-17].

Therefore, this study was developed with the objective of tracing the profile of women attending a gynecology outpatient clinic in a city of the hinterland of Paraiba and identifying the presence of possible risk factors for vaginal candidiasis.

## Method

The study is of exploratory, descriptive, quantitative type, held at the Health Center Frei Damião, in the municipality of Patos – Paraiba, in the period from July to November 2014, with the data source a structured script, covering items which allowed characterizing the socioeconomic status, health indicators and possible risk factors for candidiasis in symptomatic and asymptomatic patients. Latter there was performed gynecological speculum examination, in order to collect vaginal secretion using Swuab (Culture Swuab Transport System - CSTS). Samples of vaginal secretions were obtained from collections recommended [18-19]. Analyses were performed in the microbiology laboratory Technological Vocation Centre – TVC, Federal University of Campina Grande, campus of Pombal, Paraiba. The material was seeded onto plates containing the culture medium Sabouraud Agar (Sabouraud Dextrose Agar - DIFCO). The plates were incubated at 37°C for 72 hours. After this period the reading was performed and checked the growth characteristics of the colonies of *Candida sp.*

Adopting a confidence level of 95%,  $\alpha = 5\%$  and a sampling error  $\alpha = 5\%$ , the sample totaled 197 participants. They were included in the sample

patients attending the gynecology service in the period of data collection and agreed to participate by signing the Informed Consent and Informed. In data processing we used the Statistical Package for Social Sciences (SPSS), free version 22. The numerical variables were dichotomized by the mean. Data were analyzed using descriptive statistics, with the measure of central tendency average; and the application of the chi-square test ( $X^2$ ) and the Fisher's Exact Test, when necessary, noting the values of standard deviation (SD) and Confidence Interval (CI). In compliance with Resolution 466/12, the research was approved by the Research Ethics Committee of the Federal University of Campina Grande (UFCG/CFP), CAAE 35203614.8.0000.5575 protocol.

## Results

### Characteristics of the women interviewed

The age of the women interviewed ranged from 14 to 79 years old, averaging 38 ( $\pm 14.045$ ); schooling ranged from 0 to 20 years, average 12 ( $\pm 5.378$ ); the average age at menarche and first sexual intercourse was 13 ( $\pm 1.767$ ) and 18 ( $\pm 4.032$ ) years, respectively; as the number of pregnancies and births, the average was 2 for both. However, the percentage of women who never became pregnant was 15.7% ( $n = 31$ ). (Data not shown in table)

**Table 1** made the correlation between the age group of respondents with sociodemographic variables (education and marital status), gynecological (age at menarche and first sexual intercourse and sexual activity) and obstetric (number of pregnancies and births).

The correlation age and education, it is clear that increasing the age of the investigated, the percentage of women with less education, or in whose age ranged from 39 to 79 years, met a percentage of 68.4% ( $n = 65$ ) women with 0-12 years of

**Table 1.** Distribution of participants ( $n = 197$ ) according to age group versus schooling, marital status and gynecological and obstetric antecedent.

Socio-demographic variables	Age				p
	14 to 38 (n=102)		39 to 79 (n=95)		
	n	%	n	%	
Schooling (years)					
0 to 12 (n=109)	44	43.1	65	68.4	<0.001
13 to 20 (n=88)	58	56.9	30	31.6	
Fixed partner					
Yes (n=133)	69	67.6	64	67.4	0.967
No (n=64)	33	32.4	31	32.6	
Menarche Age (years)					
9 to 13 (n=138)	75	73.5	63	66.3	0.171*
14 to 22 (n=59)	27	26.5	32	33.7	
Sexarche Age (years)					
12 to 18 (n=100)	52	51, 0	48	50, 5	0.949
19 to 40 (n=97)	50	49, 0	47	49, 5	
Number of Pregnancies					
0 to 2 (n=120)	85	83.3	35	36.8	<0.001*
3 or + (n=77)	17	16.7	60	63.2	
Number of births					
0 to 2 (n=125)	87	85.3	38	40.0	<0.001*
3 or + (n=72)	15	14.7	57	60.0	
Sexual activity					
Yes (n=172)	97	95.1	75	78.9	0.001*
No (n=25)	5	4.9	20	21.1	
Source: Research data. Patos-PB, 2014.					
p – Chi-square Test ( $X^2$ ) or * Fisher's Exact Test – statistical significance if $p < 0.05$ .					

schooling, whereas in the age group 14-38 years, this percentage was 43.1% ( $n = 44$ ). Thus, there was extreme statistical dependence between these variables ( $p < 0.001$ ). (**Table 1**)

This survey also found up 8.6% ( $n = 17$ ) of illiteracy, aged 29-78 years. However, 52.9% ( $n = 9/17$ ), were found in women over age (58 or older), and the other had aged 29-52 years. (Data not shown in tables)

By associating the age group with the marital status ( $p = 0.967$ ) and age at first sexual intercourse ( $p = 0.949$ ) was not detected statistical dependence, because the percentages between groups were roughly equivalent.

Similar to the age at first sexual intercourse, there was no statistical dependence between age and age at menarche ( $p = 0.171$ ). However, for women of younger age, it found 73.5% ( $n = 75$ ) who had

earlier menarche (9-13 years), against 66.3% ( $n = 63$ ) for higher age. (**Table 1**)

By correlating the age group with the number of pregnancies ( $p < 0.001$ ), the number of births ( $p < 0.001$ ) and sexual activity ( $p = 0.001$ ) were found to be extreme statistical dependence. In this sense, **Table 1** findings show that as age increased: increased the percentage of multiple pregnancies, with 63.2% ( $n = 60$ ) compared to the group of younger, with 16.7% ( $n = 19$ ); increased the percentage of higher parity, with 60.0% ( $n = 57$ ) compared to the group of younger, with 14.7% ( $n = 15$ ); and increased the percentage of women with no sexual activity with 21.1% ( $n = 20$ ) compared to the group of lower age with 4.9% ( $n = 5$ ).

It can be seen in the correlation between age and sexual activity that 21% of patients aged 39-79 years old was sexually inactive, compared to 4.9% in the age group 14-38 years old.

### Specifics about Candida

By questioning women about the occurrence of *Candida* in the last year, it was found that 25.4% ( $n = 50/197$ ) reported one or more episodes of this disease, of which, 22.0% ( $n = 11/50$ ) reported four or more episodes, being considered recurring. (Data not shown in tables).

For greater accuracy and understanding of the recurrence of reports of this disease made up the collection of vaginal secretion, the results revealed positive culture for *Candida spp* in 46.2% ( $n = 91$ ) of survey participants. Then we tried to establish the relationship of this positivity with possible factors related to vaginal candidiasis, as shown in **Table 2**.

To correlate the result of culture for *Candida spp* with the use (51.6%) or not (55.9%) of intimate soap, it is clear that in both groups, the negative culture percentage was slightly higher, in relation to culture positive. In view of these findings has

**Table 2.** Distribution of participants according to positivity for *Candida* versus predisposing factors.

Socio-demographic variables	Culture for <i>Candida</i>				p
	Positive		Negative		
	(n=91) 46.2%		(n=106) 53.8%		
	n	%	n	%	
Intimate Soap					
Yes (n=95)	46	48.4	49	51.6	0.545
No (n=102)	45	44.1	57	55.9	
Antibiotic use					
Yes (n=26)	17	65.4	09	34.6	0.029*
No (n=171)	74	43.3	97	56.7	
History of stress					
Yes (n=59)	18	30.5	41	69.5	0.003*
No (n=137)	73	52.9	65	47.1	
Menstrual cycle**					
Present (n=147)	76	51.7	71	48.3	0.002*
Absent (n=48)	13	27.1	35	72.9	
Source: Research data. Patos-PB, 2014.			p – Chi-square Test ( $X^2$ ) or * Fisher's Exact Test – statistical significance if $p < 0.05$ .		
** Deleted the hysterectomized.					

not been demonstrated dependent relationship between these variables ( $p= 0.545$ ). (**Table 2**)

On the other hand, the result of vaginal culture showed statistical dependence ( $p= 0.029$ ) to be correlated with previous antibiotic use (there are at least a month) because the positivity percentage of 65.4% ( $n = 17$ ) was greater than that used in/ used such medicine. (**Table 2**)

Also the use of antibiotics, the result of culture revealed statistical dependence of stress history variables ( $p= 0.003$ ) and feature of the menstrual cycle ( $p= 0.002$ ). However, the first prevailed 69.5% ( $n = 41$ ) in a negative culture for women with stress history, against 52.9% ( $n = 73$ ) positive culture for history without stress; and second, prevailed 72.9% ( $n = 35$ ) in a negative culture for women with absent menstrual cycle, against 51.7% ( $n = 76$ ) with positive culture for menstrual present, regular or irregular cycle. (**Table 2**)

## Discussion

The results of this research on age versus schooling corroborate information released by the National Research by Household Sampling (PNAD), that illiteracy is higher among older people. In Brazil, the absence of studies reaches 23, 9% among those who are 60 years old or over and 9.2% in the range 40-59 years old. And it will reduce as the age decreases: 4.6% 30-39, 2.3% from 25-29, 1.5% from 20-24 and 1% of 15-19 years old. This same research shows that the average number of years of study population aged 25 or older grew in all age groups. It emphasizes the increase in the number of years of education in the age group of 25 to 30 years old between 2001 and 2011, which increased from 7.4 years to 9.6 years [21].

The first sexual intercourse is considered a milestone in reproductive life and, though not found in this investigation, there has been increasingly early and has declined over the years [22].

Contrary to **Table 1** findings, another study [23] showed that teenagers begin their sexual lives an average of  $15.9 \pm 1.2$  years and adult reported first sexual intercourse with  $17.8 \pm 1.3$  years ( $p < 0.05$ ).

The menarche corresponds to a late event in puberty and is an important indicator of sexual maturation. But the age at menarche has a large individual variation. The trend anticipation of age at menarche is a universal phenomenon that has been observed for more than a century, and related to changes in environmental, genetic factors and variables such as ethnicity, socio-economic status and nutritional status [24-26].

So there are data in the literature that corroborate the trend of early menarche found in this study [27], in which the said menarche 3.4 months in 10 years in the population, from 12.35 years in 2001 to 12.8 years in 2010.

Regarding the age of the women and obstetric history, data corroborate those found by researchers who found that adult patients had multiple pregnancies and births [23].

Studies show that fertility in Brazil has been taking place in a sustained manner in the medium and high socioeconomic strata and recently more intensively in the strata of lower economic level [28]. The country's fertility rate, which in 1960 was 5.8 children per woman, fell to 2.3 children in 2000 and 1.9 children in 2010. The number of children per couple is declining since the late 1960 [29].

Thus, the average number of children was lower than that called replacement rate, which is 2.1 children per woman, which is the minimum children every Brazilian should generate for that in 2040, the total population of Brazil remains stable [30].

The findings for age and sexual activity were also observed in other studies [31-32], in which most women reported decreased sexual activity after menopause, in addition, 74% of women between 40 and 44 years old were sexually active, compared to 40% of women between 55 and 59, in the same condition.

It was noticed, too, that the positive culture for *Candida spp* percentage found in this study was superior to the findings of previous studies that observed 40.91% [20]. In addition, yeast of the genus *Candida* are responsible for 20-25% of genital discharge of an infectious nature, and is the second most common type of IPV, behind bacterial vaginosis [19].

About *Candida* recurrence, we have that 75% of women of childbearing age had at least one episode of candidiasis lifelong and about 5% had frequent episodes with three or more episodes per year [33].

Several polls show that depending on the age group, geographical location and socioeconomic status more than 40% of women may have one or more species of *Candida* as a constituent of the vaginal flora [34-35].

Therefore, various factors related to the host and the pathogen can be considered facilitating the colonization of the vaginal mucosa by *Candida spp* and hence the development of candidiasis. These situations relate to alter the immune response to fungus; hyperstrogenic states; use of combined oral contraceptives; pregnancy; diabetes mellitus; antibiotics; psycho-emotional factors related to stress; intimate hygiene, such as the use of inner and outer soap tampons; inappropriate self-medication, as well as factors related to virulence of the fungus. In addition, genetic factors such as lecithin expression of deficiency in the host cells may favor colonization by *Candida spp* [36].

The intimate soap keeps the acid and pH vulvo-vaginal *Candida* easily proliferates in this condition. However, in this study the reported use of this product, in part, prevented the onset of VVC. However, no investigation of the frequency of its use prevented the reliability of the findings **Table 2**.

The use of intimate toilet soap, in the vulvar and vaginal introitus region not interfere with the physiological vaginal pH and, in some situations, can protect the flora of the vaginal opening, hel-

ping to combat other infections that succumb to acid pH. Vaginal pH is a result of the secretion of organic acids by vaginal epithelial cells and the production of acid by the Doderlein bacilli from glycogen [37].

The intimate soaps act on feminine hygiene and the acidic pH maintenance, vulva and vaginal opening [38]; during the menstrual cycle, particularly during menstruation, that pH changes. Other factors also temporarily change as intercourse, condom use and internal and external absorbent [37, 39].

The statistical dependence found between positive vaginal cultivate and previous use of antibiotics can be explained because the use of antibiotics may alter the vaginal flora, as it suppresses the lactobacillus and, therefore, can trigger the selective proliferation of micro-organisms. They were being inhibited. Thus, both can increase the colonization, the infection *Candida spp* [6, 10, 40].

The lactobacillus act as guardians of female internal genitalia and, when fewer facilitate the occurrence of multiple infections [37]. These operate at three different levels against pathogens: compete with fungi, for nutrients; performing a process of co-aggregation by blocking epithelial receptors, preventing the adhesion thereof to the vaginal epithelium; and produce substances capable of inhibiting the germination of micelles [10].

The vaginal flora is rich in *Lactobacilli* producing hydrogen peroxide, which form lactic acid from glycogen, which makes the acidic vaginal pH, hindering the proliferation of most pathogens.

Many factors influence the amount of *Lactobacilli doderlein* as systemic or topical use of antibiotics, stress, medications or diseases that reduce immunity, and the hyperestrogenism [9].

Thus, the vaginal microflora is one of the most important defense mechanisms, maintaining healthy vaginal environment and preventing the proliferation of foreign microorganisms at the same [40].

Stress is related to the release of hormones that alter various aspects of human physiology and can modulate the body's defenses, increasing susceptibility to infections or worsen the course of the same, due to decreased cellular immunity [41].

Nevertheless, the findings of this research contradict this statement about stress, taking to infer that the self-report of stressful situations may have been overestimated by women investigated. Moreover, the role of humoral immunity in protection against mucosal and systemic fungal infections remains controversial [10]. Authors state that the equilibrium of the vaginal ecosystem is maintained by complex interactions between the normal vaginal flora, the microbial metabolism products, the hormonal state and the immune response of the host [42]. Thus, cellular immunity appears to be the most important factor against immune microorganism proliferation in the vagina. It occurs an activation of cell-mediated immune response, and macrophages phagocytosis and destroys effectively, which keeps the concentration of *Candida* in subclinical levels [42].

Regarding the statistical dependence of *Candida* culture and menstrual cycle, there is no consensus, but the presence of regular menstrual cycles has been identified as an important risk factor for vaginal candidiasis, with the highest incidence of cases from the peak of estradiol [43].

The explanation for this fact is that during the menstrual cycle hormonal changes occur that interfere with substrate of different microorganisms. These variations and the presence of menstrual blood leading to vaginal pH changes [39].

## Conclusion

The research revealed a high incidence of candidiasis, compared to existing data on the basis of literature consulted. Considering that most of the respondents had a low educational level, were sexually active and young adults, it is appropriate

that further research be carried out to investigate aspects of *Candida*, and that there will be educational activities in order to prevent such infestation or your aggravation.

By the fact that this infection is considered a public health problem, it is important that professionals working in this area are kept up to date on the pathogenesis of VVC, for the proper management of this infection.

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