

STUDY OF VULVOVAGINAL CANDIDIASIS AMONG NONPREGNANT WOMEN ATTENDING A TERTIARY CARE TEACHING HOSPITAL IN KARNATAKA, INDIA

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ABSTRACT

BACKGROUND

Vulvovaginal candidiasis is one of the most common infections seen in women. *Candida* spp. are normal flora of the vagina that become pathogenic under some predisposing conditions, and thus present as a common aetiology of vulvovaginitis. If the condition is not recognised and diagnosed early, this could cause serious genital discomfort and a common reason for frequent gynaecological consultation. We wanted to determine the prevalence of vulvovaginal candidiasis and influence of antibacterial therapy, age and prevailing health conditions on its occurrence among nonpregnant women attending our teaching hospital.

MATERIALS AND METHODS

A total of 400 nonpregnant women were included in the study. Samples collected were a pair of high vaginal swabs and endocervical swab samples. They were inoculated on SDA and processed. *Candida* positive cultures were identified as *Candida albicans* and non-*albicans* *Candida*.

RESULTS

In the present study, the prevalence of vulvovaginal candidiasis was found to be 14%. 20-30 years age-group showed the maximum prevalence of candidiasis. It was found that all nonpregnant women with *Candida*-positive culture were on antibacterial therapy before taking part in the study- 56 (100%). Significant statistical relationship was found between the prevalence of VVC and previous antibacterial therapy ($P < 0.05$), but not found with age or other prevailing health conditions ($P > 0.05$).

CONCLUSION

This study clearly indicated involvement of *Candida* in vulvovaginitis among nonpregnant women, particularly those on antibacterial therapy. However, culture-positive results should be clinically correlated in the definitive diagnosis of VVC.

KEYWORDS

Antibacterial Therapy, Nonpregnant, Vulvovaginal Candidiasis.

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BACKGROUND

Second most common cause of vaginitis after bacterial vaginosis is vulvovaginal candidiasis. 85% to 90% of cases is caused by *Candida albicans*.¹ VVC is an acute inflammatory disease and a common reason for gynaecological consultation as it can affect up to 75% of women of child-bearing age.² Vulvovaginal candidiasis (VVC) is a fungal or yeast infection of the female lower genital tract, the vulva, and the vagina caused by *Candida* spp.³ VVC can be recurrent or relapsing.^{4,5} If a woman presents with four or more episodes per year, it is called recurrent or relapsing VVC.⁶

Candida colonises the vagina in 20%–50% of healthy women.⁷ *C. Most common coloniser is Candida albicans*, and is responsible for most cases of VVC.⁸ But over the last decade, non-*albicans* *Candida* (NAC) species have been recovered with increased frequency, with *C. glabrata* being the predominant non-*albicans* species.^{9,10} At least one episode of VVC is experienced by 70%–75% of healthy adult women during their reproductive life, and by the age of 25 years, 50% of college women would have had one episode of VVC, diagnosed by a physician.¹¹

Differential diagnosis of VVC is leukorrhea and pruritus vulvae.¹² Hence, to confirm VVC, fungal culture and identification of *Candida* spp. are essential.

Previous studies suggested that at least one episode of VVC is experienced by about two-thirds of women during their lifetime, and multiple episodes are experienced by about 50% of women.^{13,14} Previous studies on VVC were on immunocompromised women, particularly pregnant women, individuals on broad-spectrum antibiotic therapy, diabetics, HIV-positive women and women on oral contraceptives with high estrogen content. Very few studies were conducted on VVC in immunocompetent women.¹⁵

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Alteration of vaginal microflora by invading pathogens or biochemical changes in the environment cause vaginitis.¹⁵ Changes in the vaginal environment encourage the population of Candida, enhance their adherence to vaginal epithelial cells, and help in the germination of daughter yeast cells.¹⁶ All these changes may transform asymptomatic candida colonization into symptomatic Candida infection. Like many vulvar diseases, VVC has the potential to cause great psychological distress and negatively impact a women's quality of life.

MATERIALS AND METHODS

This is a prospective study conducted in the department of Clinical Microbiology of Srinivas Institute of Medical Science & Research Centre, Mukka, Surathkal, Mangalore during January 2018 to December 2018.

A total of 400 nonpregnant women in the age group 15-45 years, with or without signs and symptoms of vulvovaginal discomfort who were referred from the General Out-patient and Department of Obstetrics and Gynaecology formed the study group. Samples collected were a pair of high vaginal swab (HVS) and endocervical swab (ECS) samples.

A questionnaire interview and detailed clinical history was taken from the patients; age, marital status, presence or absence of symptoms (vaginal discharge, itching or burning), use of antibiotics in the past, previous history of candidiasis and provisional diagnosis were recorded.

Under sterile precautions, a pair of HVS and ECS samples were collected from each nonpregnant woman. The

swabs were inoculated on Sabouraud's dextrose agar (SDA) and incubated at 25°C and 37°C respectively, aerobically for 48 hours. From the swabs, 10% KOH mounts were made and examined under the microscope using high power objective to detect the presence of pseudohyphae and budding yeast like cells suggestive of Candida.¹⁷

The pasty, yeasty and creamy colony that showed Gram positive budding yeast like cells with pseudohyphae on microscopic examination were processed further. In Candida positive cultures, Candida albicans or non-albicans were differentiated and recorded. Germ-tube test, morphology on corn meal agar, sugar fermentation and assimilation tests were performed to identify C. albicans.

The results were statistically analysed with SPSS software version 20.0. The Pearson χ^2 test at a 95% confidence interval and 0.05 level of significance was used to determine the relationships between some sociodemographic/clinical data and prevalence rates.

RESULTS

It was a hospital based prospective study over a period of one year. Of the 400 nonpregnant women studied, 56 had Candida-positive cultures from both HVS and ECS samples, hence the prevalence of VVC was found to be 14 %. Women in the age-group 20–30 years showed highest Candida-positive cultures (34 [8.5%]). Women less than 20 years of age and greater than 40 years showed least Candida positive cultures. (Table 1). Significant statistical relationship was not found between the prevalence of VVC and age ($P > 0.05$).

Subject	Age Group (years)*	Test Subjects, n	Candida-Positive Cultures, n*	Candida-Positive Cultures, %*	Positive Candida albicans, n	Positive Candida albicans, %
1	< 20	26	5	1.25	5	1.25
2	20–30	197	34	8.5	13	3.25
3	31–40	143	12	3	6	1.5
4	> 40	34	5	1.25	2	0.5
Total	400	56	14.00	26	6.5	

Note: $\chi^2=6.0$, P-value =0.777

Table 1. Distribution of Vulvovaginal Candidiasis Among Different Age Groups

Clinical Diagnosis and Presentation*	Test Subjects, n	Candida-Positive cultures, n*	Candida-Positive cultures, %*	Candida albicans-Positive Cultures, n	Candida albicans-Positive Cultures, %
Symptomatic	167	28	16.8	21	12.5
Asymptomatic	233	28	12	5	2.1
Total	400	56	28.8	26	14.6

Note: $\chi^2=5.56$, P-value >0.05

Table 2. Distribution of Candida-Positive Cultures Across Clinical Presentation

Subject	Antibacterial Therapy (days)*	Test Subjects (%)	Positive Cultures (%) *
1	Nil	0	0
2	1–7	51 (12.75)	7 (12.5)
3	8–14	145 (36.25)	11 (19.6)
4	15–21	89 (22.25)	17 (30.4)
5	22–29	115 (28.75)	21 (37.5)
Total		400 (100)	56 (100)

Note: $\chi^2=11.44$, P-value <0.05.

Table 3. Distribution of Vulvovaginal Candidiasis and Frequency of Antibacterial Therapy

Candida-positive cultures were found to be equal among women who presented with symptoms of ill health and those who were apparently healthy and voluntarily came for the study (with no symptoms of ill health). Of 167 test subjects who presented with one or more symptoms of ill health, 28 (16.8%) had candidiasis. However, of 233 women who voluntarily participated (those with no symptoms of ill health), 28 (12%) had candidiasis. Statistically significant relationship was not found between candidiasis and prevailing symptoms of ill health ($P=0.34$, Table 2). It was found that all nonpregnant women with Candida positive culture were on antibacterial therapy before taking part in the study, 56 (100%), (Table 3). In the present study, the prevalence of *C. albicans* among the nonpregnant women was 6.5% (26 of 400), and that of non-*albicans* candidiasis 7.5% (30 of 400) (Table 1).

DISCUSSION

Majority of healthy women of childbearing age are affected by vaginal candidiasis, which is a common mucosal infection caused mainly by *C. albicans*.¹⁸ Different studies have reported the prevalence of vaginal candidiasis to be 14%, 16.5%, 21.31%, and 19%.^{3,18,19,20} In the present study, the prevalence was found to be 14%. Low prevalence of vaginal candidiasis among nonpregnant women attending our teaching hospital may be due to various factors like good personal hygiene, adequate knowledge and normal levels of hormones like oestrogens and corticoids.²¹

In the present study, women in the age-group 20–30 years showed highest Candida-positive cultures (34 [8.5%]). Women less than 20 years of age and greater than 40 years showed least Candida positive cultures. These findings do not agree with the findings of Alo et al,²² who reported a higher prevalence of *C. albicans* (33.33%) in the age group of 36–40 years and lowest prevalence (20.42%) in the age group of 20–25 years. Our results agreed with Emeribe et al,³ Akortha et al,²³ and Willacy and Jackson²⁴ who reported peak vaginal infections in the age group 20–40 years. High prevalence in this age group may be due to various reasons like high sexual activity, use of contraceptives and poor personal hygiene. Increased age reduces the effect of oestrogen hormone in women, causing lower infection rates as women advance in age.

Women aged over 46 years would have reached menopause and are less or not sexually active.²⁵ Such women rarely use contraceptives to prevent pregnancy.²⁵ These elderly women also have high vaginal immunity due to decreased levels of oestrogen and corticoids, and hence resistant to vaginal candidiasis.²⁶ For all these reasons, lowest occurrence rate of vaginal candidiasis is seen in the age-group (>40 years). This finding agrees with the study by Okungbowa et al, who reported prevalence of 10% in the age-group 36–45 and 2% in the age group over 46 years. They concluded that this may be due to high vaginal immunity as women advance in age.²⁷ Moreover, it is proved that no age-group is absolutely free of vaginal candidiasis.

In the present study, statistically significant relationship was not found between the prevalence of VVC and age ($P>0.05$) or prevailing symptoms of ill health ($P>0.05$). This could be due to recurrent infections that might have caused resistance of the vagina to candidiasis.

In the present study, prevalence of non-*albicans* candidiasis was slightly higher among nonpregnant women (7.5% [30 of 400]) than that of *C. albicans* 6.5% (26 of 400). Similar findings were reported by Emeribe et al,³ Aring et al,²⁰ who also found increase in the prevalence of non-*albicans* Candida in their study. Aring et al.²⁰ reported that *C. glabrata* was the most common type of non-*albicans* Candida (10.52%) and *C. krusei* the least common type (3.51%). Vaginitis caused by non-*albicans* Candida and *C. albicans* are clinically indistinguishable.²⁸ High incidence of VVC by non-*albicans* Candida may be due to single-dose antifungal treatment, low-dosage azole-maintenance regimens, and the use of over-the-counter antimycotics.

All nonpregnant women with Candida-positive culture were on antibacterial therapy before participating in the study - 56 (100%). Prolonged use of antibacterials affects vaginal microflora (mainly *L. acidophilus*), and biochemical activity, thus increasing vaginal pH due to reduced CO₂ production, consequently leading to vulvovaginitis. Other factors such as hormonal factors also encourage overgrowth of Candida, thus causing vulvovaginitis.^{28,29} One of the major reasons for increasing incidence of VVC is widespread use of antibiotics^{30,31} But an association between antibiotics and symptomatic VVC was not found in some case-control studies^{32,33} whereas other investigators found an association.³⁴⁻³⁶

CONCLUSION

Most of the previous studies on VVC were on immunocompromised women, especially pregnant women. Very few studies were conducted on VVC in immunocompetent women. The present study helps us to understand the magnitude of the problem in our region and to implement the necessary treatment modalities. There is a need to educate people about the involvement of Candida in vulvovaginitis among nonpregnant women, with or without signs and symptoms, in order to avoid unnecessary and empirical antibacterial therapy. Also, culture-positive results should be clinically correlated in the definitive diagnosis of VVC.

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