

## RESEARCH ARTICLE

**THE PREVALENCE OF VULVOVAGINAL CANDIDIASIS (VVC) AMONG WOMEN SUFFERING VAGINITIS ATTENDED A PRIVATE GYNECOLOGICAL CLINIC, ADEN-YEMEN**Adel Jumaan Binsaad<sup>1,\*</sup>, Nazeh Al-Abd<sup>1</sup><sup>1</sup> Dept. of Microbiology and Parasitology, Faculty of Medicine, University of Aden

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**Abstract**

The study was carried out to determine the prevalence of vulvovaginal candidiasis among women suffering vaginitis. This prospective cross-sectional study was conducted among 120 women between the age of 15 to 45 years (mean age 39 years), attended a private gynecological clinic in Aden with symptoms of vaginitis between January and June 2019. A questionnaire was used to obtain information on the participants' sociodemographic data and medical history. Direct microscopic examination (10% KOH), culture on SDA, germ tube test and gram staining were used to determine the prevalence of vulvovaginal candidiasis and to differentiate between *C.albicans* and *non-albicans* species. Out of 120 women, 25 (20.8%) were diagnosed with vulvovaginal candidiasis (VVC) and 95 (79.2%) with non-candidal vaginitis. *C.albicans* was the most prevalent with a prevalence rate of 17.5%. Although not statistically significant, vulvovaginal candidiasis tended to be more prevalent among women with 25-34 years. No statistically significant association between the prevalence of vulvovaginal candidiasis and educational level and marital status. Vulvovaginal candidiasis (VVC) was slightly high in Aden and *Candida albicans* was the most common causative agent of VVC. In the clinical diagnosis of VVC, both clinical criteria and microbiological tests must be used. Further study is needed to find out the prevalence of RVVC among women in the Aden governorate.

**Keywords:** Vulvovaginal candidiasis, Prevalence, *Candida albicans*, Antifungals, Private gynecological clinic, Aden.**Introduction**

Vaginitis is a common health problem among females of childbearing age. It is a frequent disease in the daily practice of gynecology and accounts for large numbers of visits to general practices [1], and a healthcare cost of more than \$500 million per year [1, 2]. Although vaginitis is not dangerous disease, it can effects the life quality of women [3]. Vaginitis has more than one etiology and can be infectious and noninfectious, such as vaginal atrophy, allergies, and chemical irritation [4]. More than 90% of infectious vaginitis cases are due to bacterial vaginosis, vulvovaginal candidiasis, and trichomoniasis [5].

Vulvovaginal candidiasis (VVC), or fungal inflammation of the vulva and vagina, also has other names such as "vaginal candidiasis," "vaginal yeast

infection" and "candidal vaginitis." VVC accounts for approximately 25% to 33% of infectious vaginitis [6]. It is estimated that 70-75% of sexually active, reproductive aged women will get an episode of infection during their life, of which 5% will develop recurrent vulvovaginal candidiasis (RVVC) [2, 7, 8, 9], that is defined as at least four symptomatic episodes of vaginitis in one year, and which are confirmed microscopically or by cultures [10, 11].

*Candida albicans* (*C. albicans*) is the most common cause of VVC, accounting for 80-95% of all cases worldwide. However, non-albicans species (non-albicans spp.) such as *C. glabrata*, *C. krusei*, *C. tropicalis*, and *C. parapsilosis* are responsible for 20% of cases [12, 13]. *Candida* spp. are found in oral cavity, gastrointestinal tract and in vagina as normal microflora of about 20% of asymptomatic childbearing women.

*Lactobacillus species* are also vaginal microbiota. They maintain the vaginal pH at <4.5, and prevent the overgrowth of candidal spp. and interfere with their adherence to vaginal epithelial cells. Alteration in vaginal microflora, changes vaginal pH, and leads to overgrowth, and proliferation of opportunistic microorganisms including *Candida* spp. and pathogenic bacteria, predisposing the woman to infections [11].

There is a relationship between the occurrence of VVC and the long treatment with broad spectrum antibiotics, use of contraceptives and steroids, and malnutrition, obesity, pregnancy, poorly controlled diabetes mellitus, and immunosuppression due to human immunodeficiency virus (HIV) [6, 14]. In addition, vaginal douches, deodorant sprays, scented toilet paper, and tightly-fitting synthetic-fiber cloths also can predispose to VVC. Moreover, hypersensitivity reactions also may play a role in VVC [4].

Detailed epidemiological data about VVC is not available. This may be related to the fact that laboratory examinations required to confirm the diagnosis are not performed routinely [8]. In addition, this condition is often self diagnosed and self treated due to a wide availability of over-the-counter (OTC) treatments, and many patients with VVC likely do not present for care [9]. In addition, information regarding the prevalence of VVC in Aden is scarce. In order to ensure a rational choice for empirical and definitive antibiotic therapy of VVC, it is very important to know the prevalence of infectious agents causing VVC in our community. For this reasons, the aim of the this study was to determine the prevalence of VVC in Aden, Yemen. In addition, the socio demographic characteristics were also investigated.

## Materials and methods

A prospective cross-sectional survey was conducted among women attended a private gynecological clinic in Aden with symptoms of vaginitis such as itching, pain, irritation, foul vaginal odor, vaginal discharge, and redness and swelling of vagina on examination, between January and June 2019.

A total of 120 women who agreed to participate were enrolled in the study. The inclusion criteria were positive direct microscopic examination by 10% potassium hydroxide (KOH) and fungal culture on Sabouraud dextrose agar medium (SDA).

On the other hand, the exclusion criteria included menstruating or having vaginal bleeding, using any vaginal suppository drugs, or had received antibiotics in the past four weeks, having visible vaginal or cervical mass suspected cancer, within six weeks of post-abortion or postpartum, and negative direct microscopic

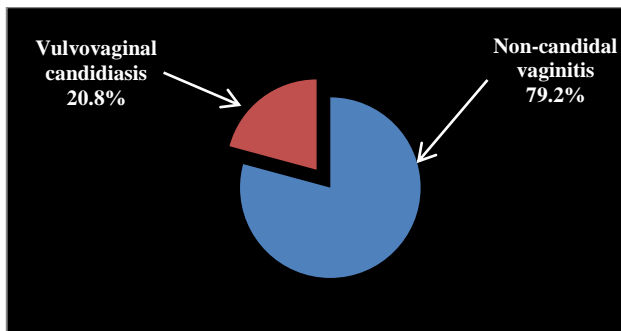
examination and fungal culture on SDA. Randomisation process was applied to recruit the participant women.

A questionnaire was used to obtain information on the participants' sociodemographic data and medical history. Oral consent was obtained from all participants after the explanation of the purpose of the study. Women included in the study were informed do not douche, have sex, or use vaginal medicines for 24 hours before specimen collection.

On lithotomy position, pelvic examination was performed. An un-lubricated speculum was inserted into the vagina and samples of the vaginal discharge were obtained with two sterilized dry cotton-wool tipped swabs from the posterior fornix region by specialized doctor. The first swab was immediately mixed with a drop of 10% KOH on a clean microscopic slide, and a cover slip was placed. Then the microscopic slide was examined under the light microscope using 20 x and 40x magnification to identify the presence of oval to spherical yeast cells with budding. The second swab was used for culture on SDA (Himedia; India), which prepared according to manufacturer instructions. The plates were incubated at 30°C for 24-48hrs. Identification of *Candida* spp. isolates was based on cultural characteristics such as the shape, size, color and consistency of candidal colonies on culture medium [15]. Gram staining of isolates was performed to confirm the growth. In addition, germ tube formation test [16] was performed to differentiate between *C. albicans* and non-*Candida* species (other *Candida* spp.). Formation of germ tubes within three hours of incubation of the examined yeast in human serum at 37°C is a diagnostic characteristic of *C. albicans* (germ tube test positive). Other *Candida* species are not germ tube formers (germ tube test negative) within 3 hours. After incubation a drop of the incubated serum was placed on a slide, covered by cover-slip and examined by the light microscope for the presence of germ tubes. Data were analyzed by SPSS program. Comparison between groups was performed by using the Chi-square test for categorical variables. P-Value < 0.05 was considered statistically significant.

## Results

As seen in figure 1. according to direct microscopic examination by 10% potassium hydroxide (KOH) and culture on SDA out of 120 women 25 (20.8%) women were diagnosed with VVC and 95 (79.2%) were diagnosed with non-candidal vaginitis.



**Fig. 1:** Causes of vaginitis.

Thus, the prevalence of VVC and vaginitis caused by other causes was 20.8% and 79.2% respectively. On the basis of germ tube formation test, *C.albicans* and non-*albicans* spp. were responsible for 21 (84%) and 4 (16%)

of VVC cases respectively. Therefore, the prevalence of *C.albicans* and non-*albicans* spp. was 17.5% and 3.3% respectively. On the other hand, seven (7 of 25) of the women diagnosed with VVC had a past history of treatment with antifungals. Consequently, the prevalence of acute VVC and RVVC were 72% (18 of 25) and 28.0% (7 of 25) respectively.

Table 1 shows the demographic characteristics of patients. The patient's ages ranged from 15 to 45 years (mean age 39 years). The majority (52.5%) of the women in this investigation were between 25 and 34 years of age and about 90.8% were married and the about 58.3% of patients were illiterate and completed the elementary, and 8.4% were completed university.

**Table 1:** Demographic characteristics of patients with vulvovaginal candidiasis

Characteristics	Vulvovaginal candidiasis		Non- candidal vaginitis		Total		Statistics P Value
	No	%	No	%	No	%	
<b>Age (years):</b>							
15-24	4	20	16	80	20	16.7	$\chi^2= 0.1643$ P= 0.9211
25-34	14	22.2	49	77.8	63	52.5	
35-45	7	18.9	30	81.1	37	30.8	
<b>Marital status:</b>							
Married	21	19.3	88	80.7	109	90.8	$\chi^2= 1.7709$ P= 0.1833
Not married	4	36.4	7	63.6	11	9.2	
<b>Educational level:</b>							
Illiterate	6	31.6	13	68.4	19	15.8	$\chi^2= 4.8513$ P= 0.183
Elementary	13	25.5	38	74.5	51	42.5	
Secondary	4	10	36	90.0	40	33.3	
University	2	20	8	80.0	10	8.4	

Also the table reveals the association between demographic characteristics of the studied sample and prevalence of VVC. The peak age group (56.0%) for VVC was 25-34 years. VVC was more prevalent among married women (84.0%), than in unmarried (16.0%). Of all the infected women, the illiterate and the elementary group represented 76.0%, the secondary group 16.0% and the university group 8.0%. Although, VVC was more prevalent among married women than those who unmarried, statistical analysis showed no significant association between VVC and marital status ( $P = 0.1833$ ). Also, no significant association was observed between the disease and age and educational background ( $P = >0.05$ ).

## Discussion

In this study, out of 120 women 25 (20.8%) women were diagnosed with VVC and 95 (79.2%) with non-candidal vaginitis. The result of this study was in agreement with other studies that reported prevalence rate of 25%, 18.5% and 19% [17, 18, 19]. However, in contrast to the current study, higher VVC prevalence rates were reported in Nigeria by EA Ugwa (84.5%) [20] and in India by Kalia N et al. (31%) [21]. On other hand, in a study conducted by Emeribe et al.[22], among population that consisted of highly educated women with good personal hygiene, a low VVC prevalence rate of 14% have been reported.

Variations in the prevalence of VVC vary considerably and depend on features of studied populations, geographical distribution, diagnostic methods, adequate knowledge, good personal hygiene, and normal levels of estrogens and corticoids [23]. However, the prevalence of VVC is underestimated because the laboratory examinations required to confirm the diagnosis of VVC are not performed routinely. In addition, VVC is often self diagnosed and self treated due to a wide availability of over-the-counter (OTC) treatments, and many patients with this condition likely do not present for care [9].

On the other hand, in this study, seven (7 of 25) of the women diagnosed with VVC had a past history of treatment with antifungals. Consequently, the frequency of RVVC was 28.0% and this result was agreed with previous study [24].

According to the age, in this study the peak age of VVC was the age group between 25-34 years (56.0%). The increase in prevalence in this age group may be due to the childbearing age, higher sexual activity, use of contraceptives, physiological and hormonal changes, that lead to increase in glycogen content in vagina which enhance lactic acid bacteria, that consume glycogen, resulting in decrease in vaginal pH that encourage *Candida* growth [6, 14, 24]. This findings were in agreement with other studies [14, 25, 26]. However,

there was no statistically significant association between the age and the disease. The sample size in this study might be was not enough to yield the power of significance. Also, no statistically significant association was found between marital status and VVC. This finding was in agreement with previous studies [27]. However, other study shown a significant correlation between the prevalence of VVC and marital status [24].

In this study the prevalence of VVC was high among patients with illiterate and elementary educational level (76.0%), but there was no significant association between educational level and prevalence of VVC. Similar finding was reported by previous study [26]. Since the majority of the women (58.3%) in this study were with moderate level of education (illiterate/elementary), therefore, the slightly high prevalence of VVC (20.8%) reported in this study might be due to the differences in the studied population's education level.

In this study, the prevalence of *C.albicans* and non-*albicans* spp. was 17.5% and 3.32% respectively. In addition, *Candida albicans* and non-*albicans* spp. were responsible for 84% and 16% of VVC cases respectively. This finding was in agreement with several studies from different countries that have been shown that *C. albicans* is the most common cause of VVC, accounting for 80–95% of cases, while non-*albicans* spp. for 5 to 20% [28-32]. This may be related to the ability of *C. albicans* to adhere to vaginal mucosa, that is essential step in establishment of a fungal infection [6]. However, in contrast to this study, different studies reported an increase in incidence of VVC caused by non-*albicans* species, where *C. glabrata* was the most common isolated species [22, 33]. The reasons for this increased prevalence of VVC caused by non-*albicans* species, is thought to be due to single-dose antifungal or incomplete local or systemic treatment, low-dosage azole-maintenance regimens, the use of over-the-counter antifungals, and the increasing use of prolonged anti-fungal courses to prevent RVVC [34]. Other reason for this condition may be the appearance of resistant *C. glabrata* to azole agents, especially fluconazole [9]. Moreover, it was reported that RVVC more frequently caused by resistant non-*albicans* spp. such as *C. glabrata* and *C. krusei* [35, 36].

Therefore, for effective treatment of VVC and RVVC, it is advisable to identify the *Candida* spp. along with clinical symptoms and their susceptibility to antifungals before planning for treatment [37]. Although, Fidel et al. [7], showed that symptomatic RVVC might be due to an aggressive innate response, while Nyirjesy et al. and Miles et al. demonstrated that RVVC can be a cause of noninfectious agents such as hypersensitivity [37]. Unfortunately, identification of *Candida* spp. is not performed in our practice routinely. For this reason, the

results of this study suggest that gynecologists should consider the prevalence of resistant non-*albicans* spp. before prescribing an antifungal drug.

One of the study limitations, the current study didn't attempt to identify non-*albicans* spp. and their susceptibility to antifungals due to unavailability of API-20 C AUX system and financial constraints.

## Conclusion

- The present study reveals slightly high prevalence (20.8%) of VVC among women attending the private clinic in Aden, and shows that *Candida albicans* was the most frequent (84%) of *Candida* species accounting for VVC.
- The prevalence of *C.albicans* and non-*albicans* spp. was 17.5% and 3.3% respectively.
- *Candida albicans* was more prevalent (56.0%) among women under age group 25-34 years.
- *Candida* spp. were more prevalent among married women (84.0%).
- Acute and recurrent VVC were 72% and 28.0% respectively.

## Recommendation

- i. Owing to inaccuracy of clinical diagnosis of VVC, it is recommended to use both clinical criteria and microbiological tests such as direct microscopic examination of vaginal discharge. In addition, if microscopic examination is negative for presence of *Candida* spp. but VVC is suspected on the basis of clinical criteria, culture and susceptibility test should be performed to identify the *Candida* spp. that may be resistant to antifungals or to exclude other causes of vaginitis, particularly in women with recurrent VVC.
- ii. Further investigation must be done in more samples to detect the prevalence of recurrent VVC and to identify the *Candida* spp. involved and their susceptibility to antifungals among women in Aden governorate.

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## معدل انتشار التهاب داء فطر المبيضات المهبلية بين النساء اللواتي يُعانين من التهاب المهبل وترددنا على العيادة الخاصة لأمراض النساء، عدن-اليمن

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### المُلخَص

هدفت هذه الدراسة لتحديد معدل انتشار التهاب داء فطر المبيضات المهبلية بين النساء اللواتي يُعانين من التهاب المهبل. تم إجراء دراسة مستقبلية مقطعية بين 120 امرأة تتراوح أعمارهم بين 15 و45 سنة (متوسط العمر 39 سنة) يعانين من أعراض التهاب المهبل، وتمت معاينتهن في عيادة خاصة لأمراض النساء في عدن، خلال الفترة الواقعة بين يناير إلى يونيو 2019. تم استخدام أستيبيان لجمع المعلومات الديموغرافية والتاريخ الطبي للمشاركات. ولتحديد معدل انتشار التهاب داء فطر المبيضات المهبلية ولتفريق بين المبيضة البيضاء *Candida albicans* والأنواع الأخرى من فطر المبيضات (*non-albicans spp.*) تم استخدام طريقة الفحص المجهرية المباشر (10% هيدروكسيد البوتاسيوم) والعزل على SDA وأختبار الأنبوب الجرثومي وصبغة جرام. أظهرت النتائج أن من أصل 120 امرأة، تم تشخيص 25 (20,8%) امرأة مصابة بالتهاب داء الفطر المبيضات المهبلية ((Vulvovaginal Candidiasis (VVC)) و95 امرأة مصابة بالتهاب المهبلية الغير فطري (non-candidal vaginitis). وقد كانت *Candida albicans* الأكثر شيوعاً من الأنواع الأخرى لفطر المبيضات بمعدل انتشار 17,5%. وبالرغم من عدم وجود دلالة إحصائية فقد أظهرت النتائج بأن الألتهاب داء الفطر المبيضات المهبلية أكثر انتشاراً بين النساء التي تتراوح أعمارهم بين 25-34 سنة. كما ان النتائج لم تظهر أية دلالة إحصائية معيارية مع معدل الإصابة بالتهاب داء الفطر المبيضات المهبلية والمستوى التعليمي والحالة الزوجية. خلصت الدراسة إلى أن هذا المرض يعتبر عالي نسبياً في مدينة عدن. كما ان المبيضة البيضاء (*Candida albicans*) تعتبر المتسبب الأكثر شيوعاً للمرض ولتشخيص المرض يجب استخدام كلاً من الأعراض والأختبارات الميكروبيولوجية. كما خلصت الدراسة الى الحاجة لدراسة اوسع لتحديد مدى انتشار الألتهاب داء الفطر المبيضات المهبلية المتكرر بين النساء في محافظة عدن.

**الكلمات المفتاحية:** إلتهاب المهبل الفطري، معدل الأنتشار، المبيضة البيضاء، المضادات الفطرية، عيادة خاصة للنساء، عدن.

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