



## Correlates of Vulvovaginal Candidiasis among Attendees of a Special Treatment Clinic in Nigeria

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### Authors' contributions

*This work was carried out in collaboration between all authors. Author OM conceived the study. Authors OM and BA designed the study. Author OM wrote the protocol and managed the literature search. Authors OM and SF managed the acquisition of data. Authors OM and BA performed analysis and interpretation of data. Author OM wrote the first draft of the manuscript. Authors OM, BA, SF and RB made critical revisions to the manuscript. All authors read and approved the final manuscript.*

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### ABSTRACT

**Background:** Vulvovaginal candidiasis (VVC) is very common with significant morbidity and health expenditure. Many cases are associated with concurrent infections with other sexually transmitted infections and several factors have been attributed as risks for VVC. This study sought to determine the prevalence of Vulvovaginal candidiasis and other reproductive tract/ sexually transmitted infections (RTI/STI) among female patients, evaluate concurrent infection of VVC with other RTI/STI and to identify factors associated with VVC.

**Methods:** A five year review of data collected for female attendees of a special treatment clinic was carried out. Data on socio-demographic characteristics, clinical presentation, laboratory investigations, and management were collected and analysed.

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**Results:** Four hundred and seventy three records were examined. The mean age of subjects was 31 years (SD=8.94). The prevalence of vulvovaginal candidiasis was 30.9%. The prevalence of bacterial vaginosis, genital warts and chlamydia cervicitis were 23.5%, 14%, and 11.6% respectively, while those of herpes genitalis, trichomoniasis, gonorrhoea, and syphilis were 4%, 3.3%, 1.1%, and 0.4% respectively. Co-infection with VVC was seen in 40.4% of subjects the highest being with bacterial vaginosis. Women aged less than 40 years were significantly more likely than older women to have VVC.

**Conclusion:** Vulvovaginal candidiasis is the commonest genital infection among these women. Young women are at higher risk and concurrent infections especially with bacterial vaginosis are quite common.

*Keywords: Vulvovaginal candidiasis; recurrent vulvovaginal candidiasis; reproductive tract infection; sexually transmitted infection.*

## 1. INTRODUCTION

Vulvovaginal candidiasis (VVC) is a reproductive tract infection which remains a common cause of morbidity adversely affecting women's physical and emotional health. It is associated with recurrent episodes defined as four or more episodes of symptomatic infection annually, resulting in substantial chronic discomfort and which are quite difficult to eradicate [1,2]. It has been estimated that 75% of adult women suffer at least one episode of VVC during their lifetimes and that approximately 40–50% of these will experience at least one further episode.

Reproductive Tract Infections/Sexually Transmitted Infections (RTIs/STIs) affect a lot of women worldwide. A community-based survey done in Vietnam found a prevalence of RTI/STI of 37% in married women, and VVC was the commonest infection affecting 26% of these women [3]. In hospital based studies, VVC accounts for about 20- 25% of sexually transmitted/ reproductive tract infections in women [4]. In Nigeria, it was reported by Bakare et al. [5] as the most common Sexually Transmitted Disease in women.

Vulvovaginal candidiasis is caused by the *Candida* species with 80 – 90% by *C. albicans* while non-albicans species account for the remaining [6]. VVC is not considered a typical sexually transmitted infection as the commonest mode of transmission is endogenous from the vagina of the host where it may be present as normal flora [2]. Infection results when yeasts gain advantage over competing normal vaginal bacteria and induce an inflammatory response. The sexual transmission of vaginal candidiasis is considerably less than that of other forms of vaginitis.

Several factors that have been linked with the development of VVC including, ingestion of broad-spectrum antibiotics which inhibit normal bacterial flora thereby favouring the growth of yeasts and use of oral contraceptives due to the higher prevalence of vaginal carriage of candida and therefore susceptibility to vulvovaginal candidiasis [7,8].

Studies have also confirmed the increased susceptibility of pregnant women to vulvovaginal candidiasis and some non-pregnant women preceding each menstrual period [9,10]. The presence of IUCD has been implicated as well, probably due to adherence of *Candida* to different parts of the device and its formation of biofilm [11].

VVC is also associated with poorly controlled diabetes mellitus [12]. Acquired immune deficiency syndrome is also a risk factor resulting in refractory and sometimes severe disease [13,14]. Also, the role of VVC as a significant cofactor in HIV transmission has been documented [15]. A history of previous STI such as herpes is thought to increase the risk as well.

VVC may be complicated by Recurrent Vulvovaginal candidiasis (RVVC), Vulvar Vestibulitis (VVS), and Endometritis [7,16].

A variety of other STI/RTI may coexist with VVC. The prevalence of each of these infections vary with regions [14,17].

There is no recent publication on current prevalence and pattern of vulvovaginal candidiasis and other reproductive tract infections in this environment. Moreover most available studies have not attempted to identify factors associated with VVC locally.

## 1.1 Objectives

The objectives of this study were to determine the prevalence of Vulvovaginal candidiasis and of other RTI/STI among STC attendees, evaluate concurrent infection and to identify associated factors.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

This was a retrospective review of records. The Special Treatment Clinic located in the University College Hospital, Ibadan, a tertiary health facility, was the study site. This clinic manages both males and females with sexually transmitted infections referred from other clinics within the hospital. It runs on weekdays from 8 am to 2 pm. Clinic facilities are also available to patients who walk in available without referral and constitute about 20- 30% of cases.

The study population was females presenting for the first time at the Special Treatment Clinic in a five year period preceding the study.

A total population survey of cases of reproductive tract/ sexually transmitted infections seen in a 5 year period - between July 2003 and June 2008 - at this facility was carried out yielding a sample size of 473. Records of patients below 15 years of age and those with missing vital information were excluded from the study. Approval for the study was obtained from the UI/UCH ethics review committee.

### 2.2 Data Collection

Records of all those aged 15 and above who were presenting for the first time at the facility during the period of study were retrieved from the records department using a pro forma to extract the required information. These information included demographic information such as age, marital status, and area of residence; clinical details such as previous reproductive tract Information, previous use of antibiotics, previous use of antifungals, retroviral status; sexual practices, obstetrics and gynaecologic history including sexual exposure, contraceptives method employed, number of children, pregnancy and menopause; past history, investigations done (eg high vaginal and endocervical swab for microscopy culture and susceptibility testing, urine microscopy,

serological tests etc), the diagnosis made and treatment given.

### 2.3 Data Analysis

Data extracted was entered into SPSS version 20 computer software, checked for errors and cleaned. Data was summarized by descriptive statistics such as frequency tables and charts. The relationship between characteristics of respondents and diagnosis of vulvovaginal candidiasis were tested using the chi-squared test. Multiple logistic regression analysis was carried out for significant independent associations and odds ratios and their 95% confidence intervals computed. Level of significance was at 5%.

## 3. RESULTS

### 3.1 Prevalence of STIs among STC Attendees

Table 1 shows the sociodemographic characteristics of the patients. Four hundred and seventy three cases were suitable for inclusion in the study with a mean age of 31 years (SD 8.94) and a range of 15- 65 years. The proportion having vulvovaginal candidiasis was 30.9% (146).

**Table 1. Sociodemographic characteristics of the subjects**

Characteristic	No (%)
<b>Age (years) n=473</b>	
Less than 20	20 (4.2)
20 -24	91 (19.2)
25- 29	138 (29.2)
30- 34	82 (17.3)
35- 39	55 (11.6)
40- 44	45 (9.5)
45 and above	42 (8.9)
<b>Marital status n= 462</b>	
Single	190 (41.1)
Ever married	273 (58.9)
<b>Area of residence n= 387</b>	
Low density	45 (11.6)
Medium density	163 (42.1)
High density	179 (46.3)

The pattern of infection is as seen in Table 2. It showed that 30.9% had vulvovaginal candidiasis, 23.5% had bacterial vaginosis, 14% genital warts, 11.6% chlamydia cervicitis. In addition, 4% had herpes genitalis, 3.6% unspecified genital ulcer, 3.2% trichomoniasis and 1.1% gonorrhoea.

**Table 2. Pattern of RTI/STI among the female attendees of the STC, UCH N=494**

Diagnosis	Frequency (n)	Percentage (%)
Vulvovaginal candidiasis	146	30.9
Bacterial vaginosis	111	23.5
Genital warts	66	14.0
Chlamydia cervicitis	55	11.6
Herpes genitalis	19	4
PID	18	3.8
Trichomoniasis	15	3.2
Gonorrhoea	5	1.1
Chancroid	2	0.4
Syphilis	2	0.4
Genital ulcer? cause	17	3.6
Vaginitis from other causes	43	9.1
Others	31	6.6
	<b>530*</b>	

*Higher than N due to coinfections*

### 3.2 Pattern of Co-infection

Table 3 shows the prevalence and pattern of RTI/STI Co-infection of VVC with other infections among those with vulvovaginal candidiasis. About 60% of subjects with VVC had no concurrent infection. About 40% of subjects had other infections: 18.5% bacterial vaginosis, 8.2% genital warts and 6.2% chlamydia cervicitis amongst others.

### 3.3 Factors Associated with VVC

Variables significant on bivariate analysis at 10% level of significance were entered into a multiple logistic regression model and the results are shown in Table 4. There was a statistically significant association of young age, less than 40 years, with development of VVC (OR 4.69, CI 1.2, 21.4). No association was found with previous antibiotic use (OR 1.32, CI 0.79, 2.25) and previous reproductive tract infection (OR 0.65, CI 0.38, 1.1) despite initial significant association.

## 4. DISCUSSION

The prevalence of Vulvovaginal candidiasis in the study population was 30.9%. This is within the range of findings of 20-45% cited in previous works such as 21% by Oni and associates, 23.5% by Jindal et al. in 2007 and 45% by Namkinga et al. [18-20].

**Table 3. Prevalence and pattern of co-infection of VVC with other infections among those with vulvovaginal candidiasis**

	Frequency (n)	Percentage (%)
VVC only	87	59.6
VVC + other infections*	59	40.4
All VVC cases	146	100.0
<b>Other infections</b>		
Bacterial vaginosis	27	18.5
Genital warts	12	8.2
Chlamydia cervicitis	9	6.2
Genital ulcer, ?cause	4	2.7
Trichomoniasis	3	2.0
PID	2	1.4
Herpes genitalis	2	1.4
		40.4

Those who had Bacterial vaginosis (BV) made up 23.5% of the total population making it the second most common RTI in these women. This finding is also similar to reports of VVC and BV as the two most common RTI in women worldwide with the prevalence of one superseding the other depending on the population studied [21].

In the study population, the prevalence of genital warts was 14.2% and we noticed a high prevalence of retroviral infection among them. At least 40% of those with genital warts were retroviral infection positive. This corroborates findings that HIV is a risk factor for genital warts and also, genital warts are worsened in the presence of HIV [22,23]. Chlamydia cervicitis was seen in 11.1% of the study population and this is important as *Chlamydia trachomatis* infection is a known cause of infertility in women. Trichomoniasis, a typical sexually transmitted cause of vaginitis was seen in 3.0% of the subjects while herpes genitalis was found in 3.8% of attendees.

The prevalence of gonorrhoea was quite low, 1.2%, in comparison with existing literature in which the records are those of both male and female patients combined. This is probably because the population was made up of only women, many women usually have asymptomatic infection and may therefore not seek medical attention unlike in their male counterparts in whom symptomatic infection is the norm and therefore present for treatment. It might also be because a high percentage had taken antibiotics before presentation which might affect the yield of culture in spite of the presence

of the infection. Namkinga et al also noticed a similar low prevalence of 1.5% in their study population of women [20].

There was a remarkably high rate of co-infection of VVC with other RTIs. About 40% of women with VVC had other infections with the highest rate of half of co-infections seen with bacterial vaginosis. Most related literature mention the fact that there could be co-infections with VVC but those citing actual prevalence are scarce except for the study by Gable et al, where they found a prevalence of 17% of co-infections with predominantly trichomoniasis [17]. It is therefore important to bear in mind that a woman presenting with symptoms of VVC may have other infections, most often bacterial vaginosis, especially in resource poor settings such as this, where the syndromic approach is often applied.

We found that a combination of vaginal discharge and vulval itching was the commonest presentation of VVC in these women followed by vaginal discharge alone which is quite different from what was described by Sonnex with itching alone being the commonest symptom (27%) although it was closely followed by itching and discharge (25%) [24]. In this study, only about 10% presented with itching alone. Dysuria, which as earlier cited as being an occasional symptom, was found in about one in nine of the subjects with VVC.

Several characteristics have been discovered as risk factors for developing VVC and our work also investigated characteristics that could be associated with vulvovaginal candidiasis in this population. Age was significantly associated with VVC as our study demonstrated that younger females, who were less than 40 years, were about five times more likely to develop VVC than their middle aged and older counterparts. The finding of age being associated with VVC has been documented earlier and is said to be highest between the ages of 15 to 19 years [21]. This could be because younger women are more likely to be more sexually active than older

knowing that the incidence is higher with sexual activity. Also younger women have higher levels of hormones than older women whose levels begin to dwindle as they approach menopause. The odds of having VVC was found to be about 1.5 times higher in those with a previous RTI than those without any suggesting a possible association, however, this could not be substantiated as the relationship was not statistically significant.

Initial data exploration showed that those who had taken antibiotics were at higher risk of candidiasis. This relationship proved not to be statistically significant on multivariate analysis. This is in spite of the established association between antibiotic use and VVC [2,7,8,21,25]. Reasons adduced for this could be because available data for this study did not specify the duration between the use of the antibiotics and development of symptoms. The usual time frame for recent ingestion is usually within about 4- 6 weeks thus if it is more than that, it might not be relevant thus affecting the testing of this hypothesis [8].

This study also did not demonstrate any association between the use of hormonal contraceptives and VVC and also between the presence of IUCD and VVC though some previous studies have reported such associations [11,21]

The small proportion of pregnant women present in this study may account for our inability to detect an association between VVC and pregnancy as reported by researchers such as Grigoriou [26] Retroviral infection is known to have an important relationship with vulvovaginal candidiasis [20], however; this study did not reveal such also likely due to the small sample size. More than 90% of the attendees did not have their retroviral status determined as this was not a routine investigation at the facility at that time except when there are strong indications such as cases of genital warts and ulcer.

**Table 4. Logistic regression analysis for variables significant on bivariate analysis**

Variable	Odds ratio	95% CI OR	P value
Middle-aged vs young	4.69	1.2, 21.4	0.04
Married vs Single	1.27	0.66, 2.46	0.46
Parous vs nulliparous	1.06	0.83, 1.38	0.61
Previous infection vs none	0.65	0.38, 1.1	0.11
Previous antibiotics vs. none	1.32	0.79, 2.25	0.29

This study was limited by insufficient data as secondary data was used therefore parameters not routinely collected at this facility could not be explored. For example, douching is a common practice in women, including Nigerian women, and has been reported widely as a risk factor for genital infections in women but we could not test that association as there were no records for this characteristic [27,28].

## 5. CONCLUSION

This five year review shows vulvovaginal candidiasis to be the commonest reproductive tract infection in female attendees of our centre, followed by bacterial vaginosis.

Young females have a higher risk of VVC than older patients and also, co-infections should be borne in mind when managing patients with sexually transmitted infections.

## CONSENT

It is not applicable.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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