Prevalence of Vulvovaginal Candidiasis in Fertile and Sub-fertile Women in Port Harcourt Nigeria: A Retrospective Study

Abstract

Introduction

Vulvovaginal candidiasis (VVC) is an infection, which causes the inflammation of the vulva and vagina caused by *Candida albicans* or other non-*Candida albicans* species. It is very common among women in the reproductive age, among whom, it is the commonest cause of vaginal itching and discharge. It is also the second commonest vaginal infection after bacterial vaginosis. This study was conceived to ascertain the prevalence of VVC in fertile and sub-fertile women attending public and private healthcare facilities.

Materials and Methods

This retrospective cross-sectional study involved a review of laboratory records of 290 females attending public and private healthcare facilities and walk-in patients from across Port Harcourt between January and December 2018. The review focused on cultures of High Vaginal Swab (HVS) specimens The specimens included in the study were those with complete records of the age, reasons for seeking investigation, marital status, childbirth, and the isolated organisms.

Results

The culture records indicate an overall prevalence of 57.2%. Across age groups, the highest prevalence of 67.3% was found within the 23-27 age brackets, while the least was the >42 age bracket recording a prevalence of 23.3%. Within the classification of marital status, the singles had 64.7%, while married women had 51.0%.; under childbirth, those who had children recorded 52.1%, as against 62.3% for those yet to have children. With respect to fertility status, the fertile women were 86.1% and sub fertile women 51.1%.

Conclusion

Vulvovaginal candidiasis is associated with increased risks of complications during pregnancy, including premature rupture of membranes and poor pregnancy outcomes including chorioamnionitis, preterm labour and. congenital cutaneous infections. While this study has succeeded in determining the prevalence of VVC in the study area and population, more efforts need to be put to unravel and clarify the risk factors, consequences, preventive measures and improved outcomes for treatment.

Keywords: *Vulvovaginal candidiasis, genitourinary, microbiota, High vaginal Swab, Sub-fertile* women

Introduction

Vulvovaginal candidiasis (VVC) is a commonly occurring infection of the female genitourinary tract, where it causes of vaginitis or inflammation of the vagina and vulva.[1] It is the commonest cause of vaginal itching or irritation and discharge, producing white, curd-like or fluid discharge mostly in women of reproductive age.[2] VVC is linked with about 90% of the symptomatic vaginal infections, while an estimated 70 to 75% of healthy women experience symptomatic infections at least once in their childbearing years, while some 40–50% of women undergo recurrent and stubborn symptoms of the infection.[3,4] These symptoms of recurrent vulvovaginal infections (RVVI), put the affected women through a lot of misery and unease transcending medical and epidemiological concerns to social and psychological problems.[4,5]

The primary aetiologic agent of vulvovaginal candidiasis is the polymorphic opportunistic fungus, *Candida albicans*, and other closely related *Candida* species which are members of the

human microbiota, found mostly in the vagina. While *Candida albicans* is implicated in over 90% of cases of VVC, the role of non-candida albicans such as *C. glabrata*, *C. krusei, C. tropicalis, C. parapsilosis* in the aetiology of the infections are being increasingly recognized[3,6,7]. *Candida albicans* is a commensal fungus commonly colonizing different parts of the human microbiome such as the oropharyngeal cavity, gastrointestinal, vaginal tract, and skin of healthy individuals as part of the normal flora of the microbiota. As a highly evolved opportunistic pathogen, it can transit from normal flora to a pathogenic agent of various localized, superficial mucocutaneous disorders and invasive conditions involving numerous organ systems and may be life-threatening.[8] While it is commonly associated with invasive and localized infections in immunocompromised individuals, it causes VVC in immunocompetent persons.

While primary recurrent vulvovaginal candidiasis (RVVC) is idiopathic, without identifiable predisposing factors in otherwise healthy immunocompetent women, several factors are identified to play roles as predisposing factors for secondary RVVC[7]. Some of these are the use of antibiotics, pregnancy, diabetes mellitus, use of oral contraceptive pills, human immunodeficiency virus infection, wearing tight and nylon underwear with inadequate ventilation, vaginal douching, immunosuppressive drugs, use of an intrauterine device, certain behavioral factors including those associated with sexual activities, local vaginal immune deficiency, using tampons instead of sanitary napkins, use of condoms with or without spermicides, contact with certain chemicals anal and oral sex. However, each of these factors could have an effect on incidence of recurrent chronic candida[2] The high levels of reproductive hormones during pregnancy are found to provide glycogen as an excellent carbon source for the proliferation of *Candida* organisms, while contraceptives methods like IUD, diaphragms, and condom with or without spermicide are known to trigger the infection, high sugar plasma levels in diabetes mellitus as well as high sugar diets in non-diabetic persons also contribute to proliferation of the yeasts, while antibiotics deplete bacterial flora and cause overgrowth of the fungal flora. Behavioral factors that may lead to increased incidence of VVC include douching, sexual activity, cotton underwear and contact with certain chemicals[9] Depression, helplessness, hopelessness, and stressful life events may lead to the disease by inhibiting the immune systems of individuals[2]

Vulvovaginal candidiasis constitutes a public health concern affecting about 138 million women worldwide; with morbidity that goes with pains, altered self-esteem, diminished output at work places, physical and emotional distress, reduction of sexual and affective relations, poor academic performance and economic losses [10] Nevertheless, there appear to be very few data in the subject area in Nigeria.[11] This study was thus conceived to contribute in filling the gap by determining the prevalence of VVC in fertile and sub-fertile women attending public and private healthcare facilities in Port Harcourt, Nigeria

Materials and Methods

Port Harcourt is the capital and major city of Rivers state, Nigeria. It is located on Latitude: 4°46′38″ N Longitude: 7°00′48″ E on an Elevation of 16mm above sea level, lying along the Bonny River and named after former colonial secretary, Lewis Harcourt The metropolis has a “tropical monsoon climate with a lengthy and heavy rainy season and very short dry season”. Harmattan (dusty winds) prevalent in most part of the country is relatively suppressed; December is the hottest and driest month; September witnesses the heaviest rain falls. The atmospheric temperatures are fairly stable around 25°C - 28°C. As a major city in the oil rich Niger Delta region, the economy of Port Harcourt primarily revolves around petroleum and gas industry, with much of the urbanization and modernization in the town proceeding from its associations with the oil industry.

Study Design

This is a retrospective cross-sectional study involving a review of laboratory records of 290 females attending public and private healthcare facilities and walk-in patients from across Port Harcourt. The specimens included in the study were those with complete records of the ages, reasons for seeking investigations, marital status, childbirth, and microbial isolates. The review focused on aerobic cultures of High Vaginal Swab (HVS) specimens carried out at Diagnostix and Scientifique Laboratories, Port Harcourt, Nigeria between January and December 2018.

Records of Isolation and Identification of Organisms

As contained in the standard operating procedure (SOP) manual, the HVS specimens were cultured on blood agar, Sabouraud dextrose agar and MacConkey agar (Oxoid, Hampshire, England); then incubated under aerobic conditions at 37 °C for 18 to 24 hours. The culture plates were examined visually for growths and the colonial morphologies were recorded; followed by gram-staining and biochemical testing. The morphological, biochemical, and physiological data were inputted into the ABIS online bacterial identification software, and the organisms were identified by the best match.

Data Analysis

Data were clarified using Excel spreadsheet 2016, and analyzed using IBM SPSS Statistics version 25. Descriptive and inferential statistics were employed in results presentation and interpretation. Associations between possible risk factors namely, age marital status, childbirth, fertility status and VVC were determined using Pearson's Chi-Square test of independence and Fisher exact test at significance level below 0.05.

Results

A review of the medical laboratory records of 290 women attending public and private healthcare facilities in Port Harcourt revealed the 45 of the women were undergoing evaluations for infertility while 245 were presumed to be fertile. Also, 157 of the women were married or cohabiting with males, while 133 were single, widowed, divorced or separated; 144 had given birth to children while 146 have not given birth. The age distributions show that the youngest was 18 years while the eldest was 52 years, the mean age was 32.6±8.465 years, the modal was 33 years while the median was 32 years. (Figures 1 and 2)

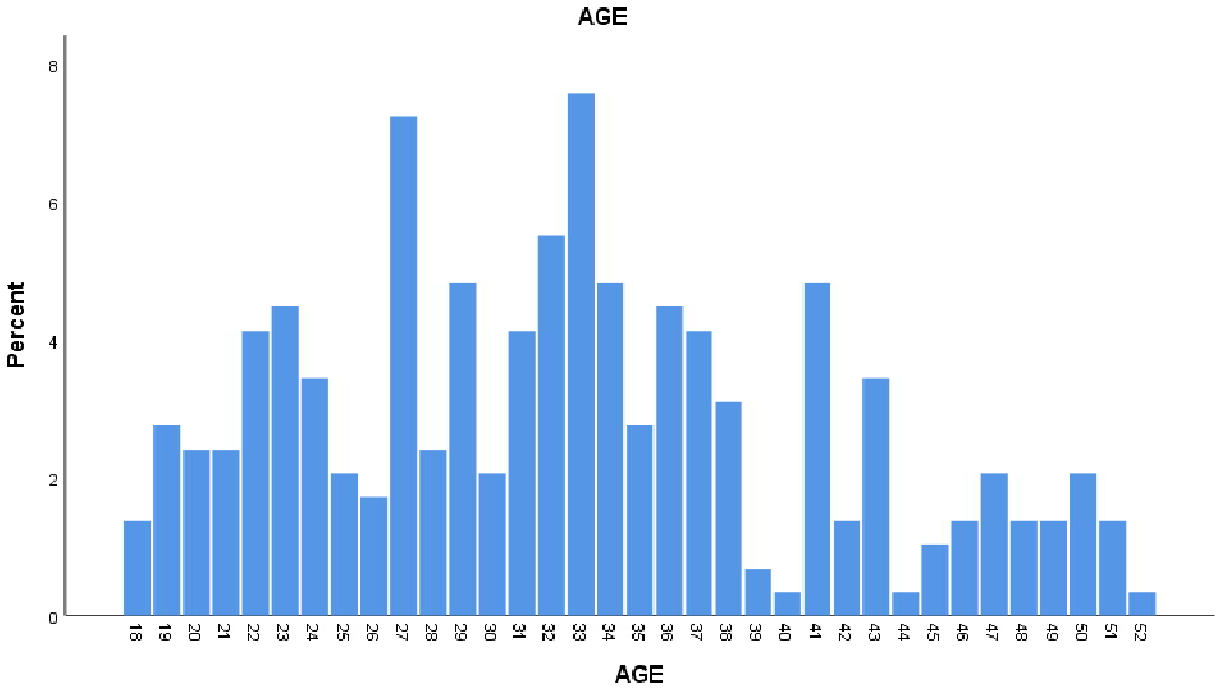

Figure 1: Frequency and Distribution of Ages of Fertile and Sub-fertile Women

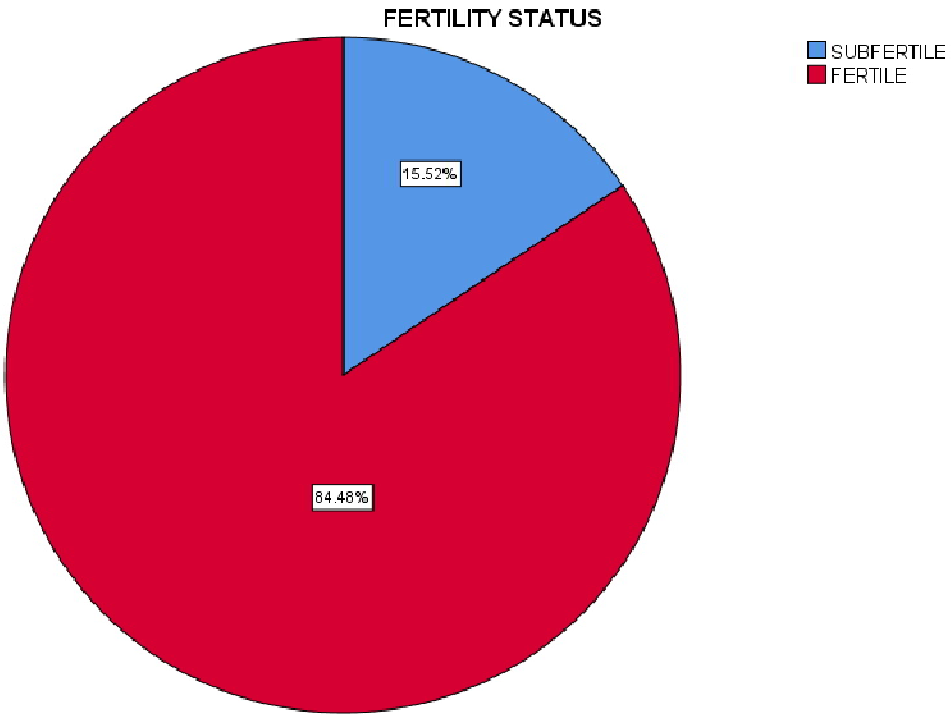

Figure 2: Frequency Distribution of Fertile and Sub-fertile Women

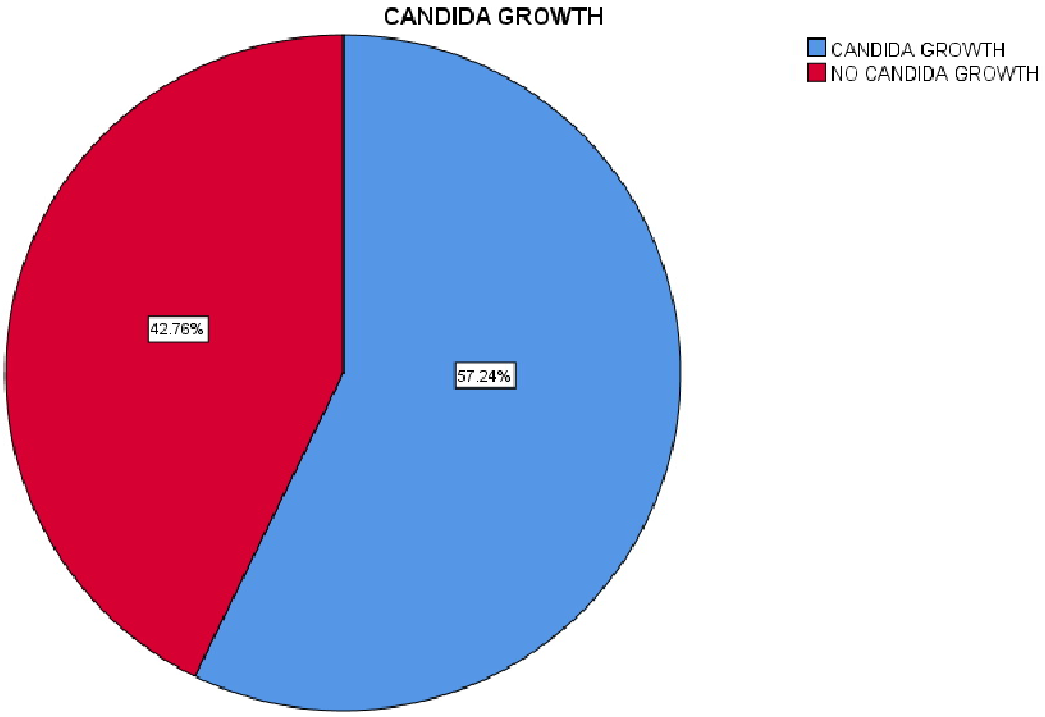

Figure 3: Prevalence of Candida Spp. Isolated from Fertile and Sub-fertile Women

Frequency and Distribution of Culture Growths

The distribution of culture growths indicates that 57.2% of the 290 cultures were positive for Candida spp. (Fig.3) Frequency and distribution of Microbial Growths show that 46.2% of the specimens yielded single growths while 37.2% produced mixed growths and 11.4% were negative cultures. (Table 1)

Table 1: Distribution and Frequency of Microbial Growths among Fertile and Sub-fertile Women

Characteristics	Frequency (%)		Prevalence (%)	
Age Brackets		**Single growth**	**Mixed Growths**	**No Growth**
18-22	38 (13.1)	20 (52.6)	15 (39.5)	3 (7.9)
23-27	55 (19.0)	23 (41.8)	25 (45.5)	6 (10.9)
28-32	55 (19.0)	27 (49.1)	20(36.5)	8 (14.6)
33-37	69 (23.8)	30 (43.5)	28 (40.6)	11 (15.9)
38-42	30 (10.3)	9 (30.0)	16 (53.3)	5 (16.7)
>42	43 (14.8)	25 (58.1)	14 (32.6)	4 (9.3)
Marital Status				
Married	157 (54.1)	66 (43.0)	66 (9.0)	25 (15.9)
Single	133 (45.9)	68 (51.1)	52 (9.0)	12 (9.0)
Child Birth				
Had Children	144 (49.7)	68 (47.2)	56 (9.0)	20 (13.9)
No Children	146 (50.3)	66 (45.2)	62 (9.0)	17 (11.6)
Fertility Status				
Fertile	245 (84.5)	119 (48.6)	98 (40.0)	27 (11.0)
Infertile	45 (15.5)	15 (33.3)	20 (44.4)	10 (22.2)
Total	**290 (100)**	**134 (46.2)**	**108 (37.2)**	**37 (11.4)**

Prevalence of Vulvovaginal Candidiasis in Fertile and Sub-fertile Women

The culture records indicate that166 (57.2%); Candida strains were recovered from 290 HVS specimens reviewed in the study. Among the age groups, the highest prevalence of 67.3% was found within the 23-27 age brackets, while the least was the >42 age bracket recording a prevalence of 23.3%. Within the classification of marital status, the singles had 64.7%, while married was 51.0%.; under childbirth, those who had children recorded 52.1%, as against 62.3% for those yet to have children. With respect to fertility status, the fertile women were 86.1% and sub fertile women 51.1%. (Table 2)

Table 2: Prevalence of Candida species among Fertile and Sub-fertile Women

Characteristics	Number Tested	Positive	Prevalence (%)
Age Brackets			
18-22	38	24	63.2
23-27	55	37	67.3
28-32	55	31	56.4
33-37	69	44	63.8
38-42	30	20	66.7
>42	43	10	23.3
Marital Status			
Married	157	80	51.0
Single	133	86	64.7
Child Birth			
Had Children	144	75	52.1
No Children	146	91	62.3
Fertility Status			
Fertile	245	143	58.4
Sub-fertile	45	23	51.1
Total	**290**	**166**	**57.2**

Frequency and Prevalence of Bacterial isolates from Fertile and Sub-fertile Women

A total of 177 bacterial strains were recovered from the HVS specimens as follows: *Escherichia coli,* (49.7%) *Staphylococcus aureus,* (39.6%) *Enterococcus faecalis,* (5.1%) *Streptococci,* (5.1%) *Proteus mirabilis* (0.6%), (Table 3)

Table 3: Frequency and Prevalence of Bacterial isolates from Fertile and Sub-fertile Women

Bacterial Isolates	Frequency	Prevalence %
Escherichia coli	88	49.7
Staphylococcus aureus	70	39.6
Enterococcus faecalis	9	5.1
Streptococci	9	5.1
Proteus mirabilis	1	0.6
Total	177	100

Statistical Analysis

Pearson's Chi-square test of independence and Fisher's exact test were performed to evaluate the relationship between the age, marital status, child birth status and fertility status (independent variables) and the growths of Candida spp. (dependent variable). The association between these child birth status and fertility status, and the growths of Candida spp. were found not be significant, given that the p values were not less than 0.05, we therefore failed to reject the null hypothesis which states that the variables are independent. In other words, there was no sufficient evidence to conclude that a significant association exists between the variable and the test results obtained for the hepatitis B and hepatitis C screening.

On the other hand, we found significant association between age and marital status with growths of Candida spp. as the p values were less than 0.05, the null hypothesis which states that the variables are independent were therefore rejected, and we hold that there is enough evidence to conclude that age and marital status are significantly associated with the prevalence of VVC

Discussion

This study has appreciably contributed in ascertaining the prevalence of vulvovaginal candidiasis in fertile and sub-fertile women attending public and private healthcare facilities in Port Harcourt, Nigeria. The overall prevalence of 57.2% as observed in this study was comparatively higher than the prevalence rates of 40%[11] and 51.3%[14] reported in tertiary hospitals in Nigeria and Vietnam respectively. These were also higher than some prevalence rates reported elsewhere; a study in Ghana reported a prevalence of 30.7% among pregnant women,[12] a prevalence of 22.2% was reported in an Obstetrics and Gynaecology clinic in a tertiary hospital in Nigeria,[13] and 36.5% in municipal hospital in Ghana[15]

Prevalences of diseases vary widely between and within countries, regions and populations depending on several identifiable and non-identifiable factors which may be geographical, cultural, economic strata, hygienic practices, developmental and governance systems amongst others. Research sampling techniques and culture methods can also introduce variations in outcomes of researches.[16] Prevalences between 12% and 90.38%[14,16] have been reported across the world.[1] This study conducted on persons attending public and private healthcare facilities, mostly primary and secondary facilities are the first point of call for most residents, especially those on the lower levels of the economic stratum who bear the highest burden of infections. Though the results compare closely with studies in tertiary hospitals among women attending Obstetrics and Gynaecology clinc[11] and non-pregnant women, it was much lower than a prevalence of 68.3%[17], from another study on persons attending primary and secondary healthcare facilities

Though the prevalences observed among various age brackets did not vary widely except the >42 age bracket which was much lower than other age brackets, the results aligned closely with the findings of another result in Port Harcourt[11] which reported the highest prevalence in the 20-29 bracket corresponding with the 23-27 age bracket in this study. Many other studies had similar results.[12] Though there is no particular range of age bracket that always has highest occurrence of VVC the outcome here aligns with several studies where the highest age brackets fall between 16 and 37 years.[16]

Statistical association was found to exist between the prevalences of VVC and marital status, but not with childbirth and fertility statuses. This was in line with some previous sudies.[9] While there may not explanain the high prevalence found in singles than married women. This may be attributable to other factors such as the use drugs and contraceptives to prevent pregnancy, which is likely to be more in singles than marred women, single are also more likely to have more sexual partners than married persons which may predispose to VVC.[16,18] While several studies have shown that pregnancy and child delivery increases chance of VVC,[16,19] a study has reported that prevalence of VVF reduces with increased parity.[20] Other predisposing factors which were not considered but may have played roles in the prevalence rates include such factors as previous or existing sexually transmitted infections, vaginal *douching,* pre-marital sexual intercourse diabetes mellitus, gestation other infections, use of pantyliners, and sexual partners having sexually transmitted infections[9]

In addition to candida spp. Some bacterial members of the female genitourinary microbiota were recovered from the HVS sample either as single growth or mixed growths with the fungi *Escherichia coli Staphylococcus aureus. Enterococcus faecalis Streptococci and Proteus mirabilis.* This is comparable to other studies where similar bacteria were isolated. In Port Harcourt the following were isolated in one study, staphylococcus aureus, Klebsiella species *Escherichia coli, Pseudomonas species, Proteus species* and *Streptococcus species*[13]; while another study recovered *Staphylococcus aureus* and *Streptococcus* species.[11] These bacteria as part of vaginal microbiota and aetiologic agents of aerobic vaginitis.

The limitations of this study were hinged on its nature as retrospective; the laboratory analysis was carried out without having the studies in contemplations. Thus, there were inadequacies of requisite socio-demographics variables, Also, molecular identification would have been a necessity, but could not be utilized. It is expected that these limitations will be factored into future studies.[17,21]

Conclusion

Some recent studies indicate that VVC linked with elevated risk of complications during pregnancy, like premature rupture of membranes and poor pregnancy outcomes including chorioamnionitis and preterm labor whereas congenital cutaneous infections are reported since decades as rare events during pregnancy.[16] While this study has succeeded in determining the prevalence of VVC in the study area and population, more efforts need to be put to unravel and clarify the risk factors and consequences of vulvovaginal candidiasis.

Consent

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

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1.

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Reference

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