GSC Biological and Pharmaceutical Sciences
eISSN: 2581-3250 CODEN (USA): GBPSC2
Cross Ref DOI: 10.30574/gscbps
Journal homepage: https://gsconlinepress.com/journals/gscbps/

(RESEARCH ARTICLE)

Check for updates

Occurrence of vaginal candidiasis among female students of Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State

Austin Achinike Okwelle * and Adeline Kelivin Bara-Hart

Faculty of Natural & Applied Science, Ignatius Ajuru University of Education Rumuolumeni, Port Harcourt, Rivers State, Nigeria.

GSC Biological and Pharmaceutical Sciences, 2022, 19(02), 131–136

Publication history: Received on 31 March 2022; revised on 06 May 2022; accepted on 08 May 2022

Article DOI: https://doi.org/10.30574/gscbps.2022.19.2.0134

Abstract

Vaginal disorders such as bacterial vaginosis, candidiasis, trichomoniasis, and *Chlamydia trachomatis* infections are common among women of reproductive age, occurring with high prevalence during pregnancy. This study investigated the incidences of vaginal candidiasis among female students in Ignatius Ajuru University of Education, Port Harcourt between Julys to September, 2021. A total population of 150 female students was used with their full consent. High vaginal swab (HVS) and endocervical swab (ES) samples was collected from each of the participating female students. The swab samples were separately inoculated onto Sabouraud dextrose agar and incubated aerobically at 37 °C for 48 hours. An overall prevalence of 38(25.3%) out of 150 female students that were sampled was observed. Out of 50 females sampled from each of the three Hostels, the highest frequency was recorded in Hostel A with 18(36%), followed by Stella Hostel with 12(24%) and the least was in Salvation Hostel with 8(6%) cases. The results revealed that students between the age range of 21-24 were more infected with the yeast with 18(36%), while those in the age range of 17-20 and 25-28 showed the same level of prevalence of 20%.The outcome of this study indicated involvement of *Candida species* in vulvo-vaginitis among female students of the institution. Sex-education workshops should be conducted to enlighten the female students on the clinical implications of *Candida albicans* in the development of vulvo-vaginal candidiasis.

Keywords: Female students; Vulvo-vaginal disorder; Candidiasis; *Candida albicans*

1. Introduction

Vulvo-vaginal candidiasis (VVC), an extremely common opportunistic mucosal infection of the lower female reproductive tract (FRT) is frequently caused by the polymorphic fungus *Candida albicans* [1]. Although, a member of the normal body commensal where it colonises the vaginal lumen asymptomatically [2], *C. albicans* can become pathogenic if growth becomes excessive. According to [3] other micro-flora can antagonize and suppress growth of the vaginal species, but if anything upsets the normal vaginal microbiota, *Candida albicans* can multiply and proliferate rapidly to produce candidiasis. The disease symptoms include vaginal itching, burning, pain and redness accompanied by vaginal discharge that consists of dead epithelium, immune cells, yeast, and vaginal fluid [1]. [4] noted that candidiasis may also be associated with sterility and sub fertility as the complication of Pelvic Inflammatory Disease (PID). Due to the large number of students that use the inadequate hostel toilet facilities in tertiary institutions and the poor personal hygienic life style of students, there are great possibilities of transmission.

The pathogenicity of *C. albicans* depends on successful secretion of virulence factors. The production of these virulence factors is triggers the change from a non-pathogenic *C. albicans* to a disease causing organism, which makes it possible

* Corresponding author: Okwelle Austin Achinike
Department Faculty of Natural & Applied Science Ignatius Ajuru University of Education Rumuolumeni, Port Harcourt, Rivers State, Nigeria.

for the pathogen to thrive, survive within the host cell and cause infection as the opportunity arises [5, 6]. In addition, [6] stated that the production of virulence factors assist *C. albicans* to successfully attach to oral tissues, colonize and evade host defenses. In order for *C. albicans* to infect the host cell, it must first react to the environmental challenges and change from the normal unicellular morphological form into the invasive, multicellular filamentous form [7]. Some of the important factors are adherence to epithelial cell surfaces, germ tube or hyphal formation and production of hydrolytic enzymes [7]. Phospholipase, protease and lipase are some of the hydrolytic enzymes *C. albicans* can produce as some of its virulence factors. Phospholipase and protease are considered to be associated with the invasive capacity of *C. albicans* [8].

The vagina could be infected by a variety of pathogens including bacteria, fungi, viruses, and other parasites. Vaginal complaints such as bacterial vaginosis (BV), candidiasis, trichomoniasis, and Chlamydia trachomatis infections are common among women of reproductive age, with high incidences during pregnancy [9]. Vulvo-vaginal candidiasis is a commonly reported gynecological condition and frequently distressing infection for many women. It may result in systemic infections in neonate and mainly diagnosed in a large numbers among women of different age groups.

Numerous studies around the world showed that *Candida albicans* is responsible for the largest number of symptomatic episodes of vaginal candidiasis. Non-albicans species are most commonly represented by *C. tropicalis*, *C. glabrata*, and *C. krusei*. Accurate species identification is important for the treatment of the *Candida* infections, as the non-albicans species of *Candida* continue to be increasingly documented [10]. While not a cause of mortality, the morbidity associated with vulvo-vaginal candidiasis makes it a major cause of mental distress and economic costs. For unknown reasons, they are more prevalent in women in sub-Saharan Africa and other low-income countries than in women in developed countries, affecting up to 55% of women in some studies [11].

Over the past several decades, the number of fungal infections caused by yeast has dramatically increased, among them, the imperfect yeast, *Candida albicans* and several related *Candida species* are of foremost importance as opportunistic pathogens in immune compromised hosts and may cause life threatening infections [12]. Their incidence has greatly increased with the introduction of broad-spectrum antibiotics, immunosuppressive corticosteroids and anti-tumor agents [13]. Vaginal candidiasis is an endemic problem globally. In Nigeria, many of the reported studies are limited to patients seen in hospital settings. This study was designed to evaluate the occurrence of candidiasis among female students of the Ignatius Ajuru University of Education, Rumuolumeni, and Port Harcourt.

2. Material and methods

2.1. Study Area

The study was conducted at Ignatius Ajuru University of Education, Port Harcourt. The University of Education lies between latitude $4^0$48’59.238”N and longitude $6^0$57’16.866”E. Three hostels (Stella, Salvation and Hostel A) representing the female hostels were chosen. The temperature of the study area varies between 21 °C and 33 °C, with an annual rain fall of 2708 mm / 106.6 inch per year. The figure below shows the location of the study area.

2.2. Sample Collection

A total of 150 female students with 50 each from Hostel a, Stella Hostel and Salvation Hostel of Ignatius Ajuru University of Education were randomly selected. Female students between the ages of 17-28 who indicated interest from each of the rooms were randomly selected for this study. Following counselling and informed consent from each participant, high vaginal swabs were collected from the vagina and rolled to collect vaginal discharge. The samples were properly packaged, labeled and transported immediately to the research laboratory for microbiological analysis.

2.3. Preparation of Media

Sabouraud dextrose agar medium was used for cultivation of the organisms, and was prepared according to the manufactures instructions. Normal saline was used as diluent and was prepared by adding 8.5g sodium chloride (Nacl) to 1 liter of distilled water.

2.4. Cultivation of Yeasts (*Candidia albicans*)

For the purpose of cultivation of yeast organism, a ten-fold serial dilution of each swab was done by adding 10ml of sterile normal saline to the swab tube and properly shaken to dislodge the yeast organisms from the swab into the solution. From the initial solution, further serial dilutions were carried out up to 10^{-3} dilutions. After which, a 0.1 ml aliquot from the final dilution (10^{-3}) of each sample was transferred onto the surface of dried sterile SDA Plates. The

inoculum was spread evenly on the surface of the Sabouraud dextrose agar (SDA) medium and the inoculated plates were incubated. The yeast colonies were counted and recorded accordingly to colony morphology. Suspected *Candidia* species were sub-cultured onto fresh sterile SDA plates to obtain pure culture and incubated at 37 ^{0}C for 24-48hours.

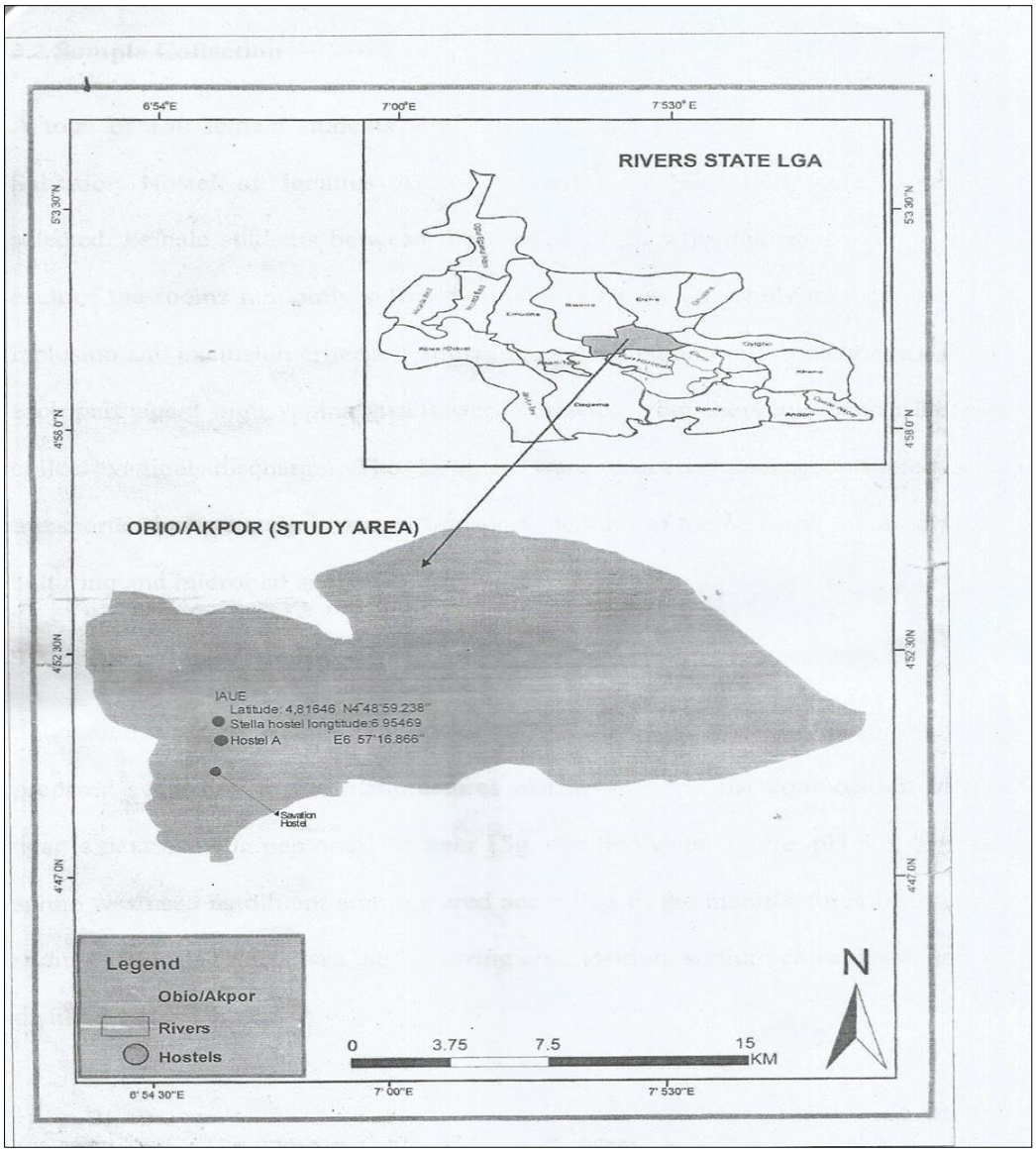

Figure 1 Map of Rivers State showing study area

2.5. Characterization of Yeast Isolates for Identifications

Pure isolates of *Candidia* species were characterized and identified by gram staining, observing the colonial characteristic, microscopy using wet preparations and germ tube production technique. Chlamydospore formation and biochemical reactions were carried out for identification of the isolated organism. Each isolate was identified by comparing the cultural, morphological and biochemical characteristics with those of [114]. The procedure was repeated for each isolate.

3. Results

There was an overall prevalence of 38(25.3%) out of 150 female students that were sampled. Out of 50 females sampled from each of the three Hostels, the highest frequency was recorded in Hostel A with 18(36%), followed by Stella hostel 12(24%) and the least in Salvation hostel with 8(6%) cases (Table 1). From Table 2, results revealed that students of the age range 21-24 were more infected with the yeast 18(36%). Age range of 17-20 and 25-28 showed the same level of prevalence of 20% out of 60 and 40 student samples respectively that were examined.

Table 1 Frequency of occurrence of *Candidia albicans* among female students

Hostels	No. Sampled	No. Positive (%)
Hostel A	50	18(36%)
Stella Hostel	50	12(24%)
Salvation Hostel	50	8(16%)
Total	150	38(25.3%)

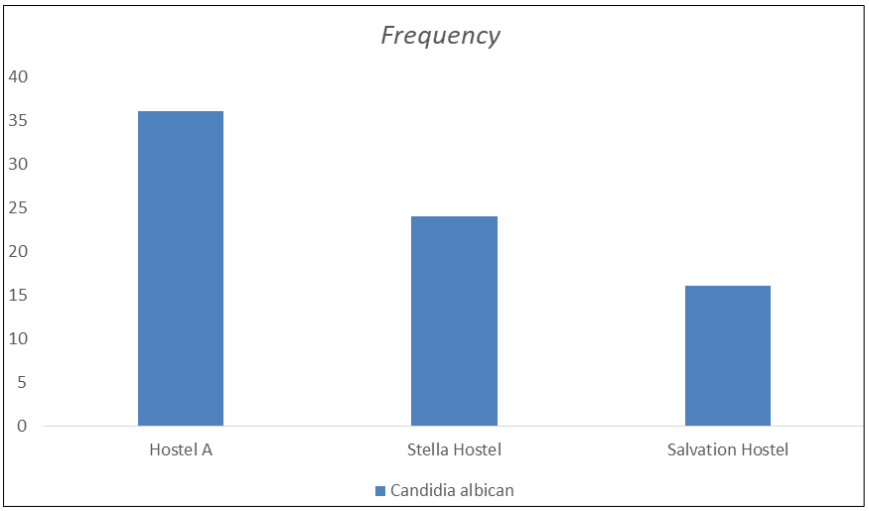

Figure 2 The prevalence of *Candidia albicans* in relation to the selected hostels

Table 2 Frequency of *Candidia albicans* in relation to the selected Age Group

Subjects	Age Group	Test Subjects	No. Positive (%)
1	17-20	60	12(20%)
2	21-24	50	18(36%)
3	25-28	40	8(20%)
Total		150	38(25.3%)

4. Discussion

Vaginal candidiasis is a common mucosal membrane infection caused predominantly by *C. albicans*, which can affect significant numbers of healthy women of childbearing age. Vaginal candidiasis is one of the common infections of general medical practice, second only to anaerobic bacterial vaginosis. About three-quarters of all women suffer at least one episode of this condition during their lifetime [15].

The prevalence of vaginal candidiasis reported by different studies was 16.5%, 21.31%, and 19% [16]. The relatively high prevalence of vaginal candidiasis among female in Ignatius Ajuru University of Education may be attributed to inadequate knowledge, poor personal hygiene, and normal levels of estrogens and corticoids [17].

Candida-positive cultures were observed mostly among the age-group 21–25 years (36%) and least among those less than 25-28 years and less than 17-20 years. These findings are not in consonance with the findings of [18] who reported a lower prevalence of *C. albicans* (33.33%) within the age bracket of 36–40 years, while those between 20 and 25 years had the lowest prevalence (20.42%). This outcome agreed with [19] and [20] who reported peak vaginal infections between ages 20 and 40 years. This may be due to high sexual activity, poor personal hygiene, the use of contraceptives, and drug abuse among this age-group. Those 21–25 years old represent the peak of childbearing in Nigerian societies,

and it was among this group that significantly high prevalence of vaginal candidiasis occurred. Advancement in age, on the other hand, reduces the effect of estrogen hormone in women, which could lead to lower infection rates as women advance in age. This finding is consistent with the observations of [21] on vaginal candidiasis among symptomatic childbearing age women in Kaduna, Nigeria, and [22] who showed that women in their reproductive years were more prone to vaginal candidiasis compared to other age groups. This according to the authors is due to the role of estrogen in inducing the lining of the vagina to produce certain glycogen; a substrate on which *Candida albicans* thrives. Hence, the absence of estrogen in younger and older women makes vulvo-vaginal candidiasis much less prevalent in these age groups [23]. Also, the incidence of Candida species during a study of Candidiasis among female students of Rivers State University was reported by [24] who showed that out of the 28 *Candida* species isolated, *Candidia albicans* had 18 (64%) incidence, while other *Candida* species were 10 (25%).

[25] reported that 90% of vaginal candidiasis is caused by Candida albicans, while 10% is due to other species of *Candida.* The incidence of candidiasis among female students in Bingham University was reported to be 26% according to [26]. In a study of the prevalence of vaginal Candidiasis among female students of in the University of Calabar, [26] detected *Candida albicans* in 20.0% of the subject sampled. Female students between the age ranges of 22-26 showed the highest prevalence of 32.3%, with students of 27-31 years age range having the least prevalence of 5.7%

5. Conclusion

Some of the female students living in the hostels of Ignatius Ajuru University of Education had a high prevalence of vulvo-candidiasis. The indiscriminate use of broad spectrum antibiotics and the practice of regular douching may have influenced the growth of *C. albicans* detected in the study. Adequate prevention and control measures should be promptly designed to prevent the exposure of the female students to risk factors so as to reduce the rate of development of vaginal candidiasis in women.

Recommendations

Based on the results obtained, the following are recommendations are desirable;

- Need for regular hostel sanitation exercise to minimize undue human and microbial contact.
- Enlightenment programs should be carried out to educate female students on the risks factors and the health implications of Candida albicans in the development of vulvo-vaginiti.

Compliance with ethical standards

Acknowledgments

The authors wish to acknowledge the permission of the management of the Ignatius Ajuru Univeristy of Education to carry out the study on the female students in that various halls of residence.

Disclosure of conflict of interest

There is no conflict of interest between the authors of this research work.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Hubertine, MEW, Salman SA, Junyan L, Zhenbo X, Brian MP. Vulvo-vaginal candidiasis: A current understanding and burning questions. Journal of Fungi. 2020; 6(27): 1-20.

[2] Achkat JM, Fries BC. Candida infections of the genitourinary tract. Clinical Microbiology Review. 2010; 23: 253-273.

[3] Ibraham SM. Prevalence of vaginal candidiasis among pregnant women with abnormal vaginal discharge in Maiduguri. Nigerian Journal of Medicine. 2013; 22: 138-142.

[4] Parveen N, Munir AA, Din I, Majeed R. Frequency of vaginal candidaiasis on pregnant women attending routine antenatal clinic. J. Coll. Physicians Surg. Pak. 2008; 18(3): 154-157.

[5] Naglik JR, Moyes DL, Wachtler B, Hube B. Candida albicans interactions with epithelial cells and mucosal immunity. Microbes Infect. 2011; 13(12-13): 963-967.

[6] Rossoni RD, Barbosa JD, Vilda SF, Jorge AO, Junqueira JC. Comparison of the hemolytic activity between C. albicans and non-albicans Candida species. Braz. Oral. Res. 2013; 27(6): 484-489.

[7] Mayer FL, Wilson D, Hube B. Candida albicans pathogenicity mechanisms. Virulence. 2013; 15, 4(2): 119-128.

[8] Donders G. Management of recurrent vulvo-vaginal candidasis as a chronic illness. Gynecologic and Obstetric Investigation. 2010; 70: 306-321.

[9] Akah PA. Frequency of Trichomonas vaginalis, Candida species and Gardnerella vaginalis in pregnant women. Journal of Medicine and Medical Science. 2010; 1 (10): 447-452.

[10] Chukwunyere D, Singh S. The prevalence of Candida species among pregnant women attending antenatal clinic in a tertiary health center in North-West Nigeria. Sahel Medical Journal. 2017; 20(1): 33-37.

[11] Guinea J. Global trends in the distribution of Candida species causing candidiaemia. Clinical Microbiology and Infection. 2014; 20(6): 5-10.

[12] Sim CR. Invasive candidiasis in immune-compromised hospitalized patients. Archives of Medical Resear. 2015; 36(6): 660-671.

[13] Glover DD, Larsen B. Relationship of fungal vaginitis therapy to prior antibiotic exposure. Infectious Diseases in Obstetrics and Gynecology. 2003; 11: 157-160.

[14] Domseh KH, Gams W, Anderson TH. Two common fungi ungi associated with farmer's lung. Fine structures of Aspergillus fumigatus and Aspergillus umbrosus. Journal of General Microbiology. 1970; 64: 373-376.

[15] Okonkwo NJ. Prevalence of vaginal candidiasis among pregnant women in Nnewi town of Anambra State, Nigeria. African Research Review. 2010; 4: 539-548.

[16] Aring BJ, Mankodi PJ, Jasani JH. Incidence of vaginal candidiasis in leucorrhoea in women attending in OPD of gynecology and obstetrics department. International Journal Biomedical Advantage Research. 2012; 3(12): 867–869.

[17] Fernández LO, Lantero MI, Betancourt A, De Armas E, Villoch A. Prevalence of Candida albicans and Trichomonas vaginalis in pregnant women in Havana City by an immunologic latex agglutination test. Medical General Medicine. 2004; 6(4): 50-55.

[18] Akortha E, Chikwe O, Nwaugo O. Antifungal resistance among Candida species from patients with genitourinary tract infection isolated in Benin City, Edo estate, Nigeria. African Journal of Microbiology Research. 2009; 3(11): 694–699.

[19] Umar FA. Vaginal candidiasis among symptomatic child bearing age in women in Kaduna, Nigeria. Greener Journal of Epidemiology and Public Health. 2017; 5(3): 021-024.

[20] Emeribe AU, Nasir IA, Onyia J, Ifunanya AL. Prevalence of vulvo-vaginal candidiasis among non-pregnant women attending health care facility in Abuja, Nigeria. Research and Reports Tropical Medicine. 2015; 6: 37-42

[21] Ugwa EA. Vulvovaginal candidiasis in Aminu Kano Teaching Hospital, North-West Nigeria: Hospital-Based Epidemiological Study. Annals of Medical and Health Sciences Research. 2015; 5(4): 274-278.

[22] Wemedo SA, Duke SJ. Incidence of candidiasis amongst female students of a tertiary institution in Rivers State. Acta Scientific Microbiology. 2020; 3(3): 1–6.

[23] Ishaku MJ, Yami AL, Zamfara KA, Nganjiwa SG. The prevalence of vaginal candida colonization among female students in Bingham University. British Microbiology Research Journal. 2016; 12(1-7).

[24] Mbim EN, Mboto CI, George UE, Umego, Edet UO, Orajiaka NA. Pevalence of vaginal candidiasis among female students of a hostel in the University of Calabar, Calabar, Journal of Applied Life Sciences International. 2017; 13(3): 1-7.