



Prevalence of vaginal candidiasis among female students in Imo State University Owerri, Nigeria

Anumihe O C^{1*}, Ohale J C¹, Nwafor I A¹, Hussaini S E¹, Onyewuenyi N¹, Emerenini O P², Anuniru C O³

¹ Department of Biology and Microbiology, Federal Polytechnic Nekede Owerri (FPNO), Imo State, Nigeria

² Department of Environmental Public Health, Concordia University of Edmonton, Canada

³ Department of Biology, Alvan Ikoku Federal Collage of Education, Imo State, Nigeria

Abstract

The present study evaluates the prevalence of vaginal candidiasis in female students of Imo State University Owerri Nigeria, within the ages of 18-26years were examined for the prevalence of vaginal candidiasis in selected medical laboratories between October to December 2020. Their personal biometric data were documented, their vaginal swab specimen were cultured, Lactophenol cotton blue staining and Germ tube test techniques were employed to microscopically confirm the presence of *Candida albicans*. The result showed that 25 out of 55 students examined tested positive with prevalence rate of 45.5%, the age group of 18 to 20 had the highest prevalence rate with 18.18%, while front gate hostels had the highest prevalence rate with 20%. These Findings reveal a relatively high prevalence rate of candidiasis among female IMSU students and underscore the need for improved personal hygiene and hostel sanitation.

Keywords: opportunistic mycosis, *Candida albicans*, Vaginitis

Introduction

Candidiasis (Moniliasis) is the mycosis caused by dimorphic fungi With *Candida albicans* being the main agent (Uwaezuoke, 2011) [26]. Candidiasis infection range from superficial infection Such as oral thrush, vaginal thrush and systemic *Candidiasis* also Known as Candidemia. *Candida* species are ubiquitous, normally present on many plants and as normal flora in the mouth, Intestine, vagina and on the Surfaces of moist skin ,most *Candida* infections are Opportunistic mycosis In patients With debilitated immune system or compromised host defenses are susceptible to while healthy people are immune to (Adeniran, 2005) [2]. Vaginitis (vaginal thrush) is an inflammation of the vagina which results in thick whitish discharge with a pH below 5.2 (without foul smell), itching, burning sensation and pain.

Vaginitis (vaginal thrush) is a common problem encountered in clinical medicine and is one of the reason women visit an obstetrician or gynecologist. *Candida* Vaginitis is associated with vaginal discharge appears to be like curdled milk and deep erythema of vulva vagina is often seen (Khan *et al.*, 2009). Therapeutic applications of immunosuppressive drugs, the use of broad spectrum antibiotics in various clinical conditions and other predisposing factors are responsible for an increasing number of immune compromised patients and consequent opportunistic infections globally (Hsueh *et al.*, 2005). A weakened or compromised immune system provides favorable conditions for pathogenic and non-pathogenic microorganisms. The virulent (degree of infection) factor of *Candida* has specific strategies to assist in colonization, invasion and pathogenesis and the virulence factor responsible for causing the infections which may vary depending on the site and stage of the infection, and the nature of the host response. Under normal circumstances, the *Candida* yeast is held in check by normal body defense together with other members of the normal flora. For example the acidity of the vagina is maintained at pH 4.0- 4.5 (Nyirjesy, 2008). This acidity level prevents some vaginal pathogens from establishing. However, physiological change in the balance of the body system would affect both beneficial and harmful yeasts, bacteria and other organisms in the body. This accordingly would alter the acidity of the vagina reducing it to pH 5.0-6.5, thereby giving room for the establishment of pathogenic organisms Such as *Candida* (Adeoye *et al.*, 2008). Nyirjesy (2008) stated that the vaginal sexual activity, pH may increase with age, menstrual Contraception choice, pregnancy, presence of necrotic tissue or foreign bodies and use of antibiotics. *Candidiasis* has caused a lot of problem in our societies these days because of the nature of the disease and the discomfort it causes to people like itching which causes a lot of embarrassment to women publicly. Secondary, *Candidiasis* cause frequent urinating to people that are suffering from the disease which makes it difficult to stay in public for a long time without being disgraced by this infection another problem with this infection is when it stays long in the body it will make the person that is suffering from it to be smelling due to severe discharge.

Findings from 450 randomly selected sexually active women in Maiduguri north eastern Nigeria showed that 14.7% had *Candida albicans* (Ojiyi *et al.*, 2012). Also Nwosu and Djieye (2007) in a study among 311 pregnant women aged 16 to 37 years reported *Candida albicans*, in 56.3% in Abakaliki south eastern Nigeria. Adeoye *et*

al.,(2009) however, in the study of the prevalence of *Trichomonas vaginalis* and *Candida albicans* among 200 antenatal women, reported 27.5% *Candida albicans*.

Candida albicans is the most common human fungal pathogen and is naturally found in healthy human reproduction and alimentary organs it can exist in two forms as either small circular cocci yeast cells or branch-like hyphae cells. *Candida albicans* species belongs to the kingdom fungi, division of Ascomycota, Class of Saccharomycetea and the family of Saccharomycetacea WHO (2001).

Candida albicans is a diploid fungus that grows both as yeast and filamentous cells and causal agent of opportunistic oral and genital infections in humans (Ryan and Ray, 2004; Denfert and Hube, 2007). *Candida albicans* readily form on the surface of implantable medical devices. Hospital acquire infection (Nosocomial infection) in patients not previously considered at risk (e.g patient in an intensive care unit) has become a cause of major health concern (Reagent et al., 1995). *Candida albicans* is a commensal organism found in the gut flora, many organism that live in the human mouth and gastrointestinal tract (GIT), under normal circumstances *Candida albicans* lives in 80% of human population with no harmful effect, although overgrowth results in Candidiasis. Candidiasis is often observed in immune-compromised individuals such as HIV positive patients, diabetic patients and patients on prolonged antibiotic administration. Infection is usually endogenous though cross-infection may occur as between infants in nursery and in the hospitals between patients and health care providers (Uwaezuoke, 2011) [26]. To infant host tissue, the usual unicellular yeast-like form of *Candida albicans* reacts to environmental cues and switches into an invasive, multicellular filamentous form (Zadik et al., 2010). Vast majority of incidence of *Candida* vaginitis are caused by *Candida albicans* with 5 to 20% produced by *Candida tropicalis* (Herbst et al., 1992). *Candida* vaginitis is a common gynecological finding among women worldwide (Anderson et al., 2004). It is of more frequent occurrence among sexually active women, which up to 75% of them have had the experience (Schroppe et al., Lisiak et al., 2003). The commonest organism implicated is *Candida albicans* (Simoes et al., 1998; Ken, 1991; Ferreji, 2000; Da Rossa and Rimel, 2004). Findings from 106 women with vaginitis in Nicaragua showed that over 70% of them were infected with yeast like organisms while *C. albicans*, *C. tropicalis*, *C. glabrata* and *C. krusei* accounted for 59, 23, 14 and 4% respectively of the yeast recovered (Bello et al., 2002). In Malaysian isolates of *Candida* were recovered from over 54% of patients from two patients from two groups, non *C. albicans* species were common in patients with recurrent vaginal Candidiasis compared to those with only one episode per year. Six yeast species were detected which include: *C. albicans*, *C. glabrata*, *C. lusitanae*, *C. famata*, *C. Krusei* and *C. parapsilosis*. Elsewhere in Australia, a trial of oral and vaginal forms of lactobacillus to prevent post-antibiotic vulvo vaginitis failed to yield the desired result (Pirota et al., 2004). In Nigeria, Nwosu in a study on patients with Aids from three (3) private medical laboratories reported vaginal Candidiasis in 34.8% as the commonest genital infection (Nwosu et al., 2001), Oyelese in Ile-Ife from a review of findings from an STI clinic reported *C. albicans* in 24% of the patients and also as the commonest agent of sexually transmitted infections (STI) encountered (Oyelese et al., 2005). And Akerele in Benin City from a study on antenatal women established *C. albicans* in 65% of the women and also as the commonest genital infectious agent encountered (Akerele et al., 2002; Namkinga et al., 2005; Tesfaye et al., 2000; 2005). Its near absence in virgins and high frequency in most sexually active women further deepens the contribution of the organism in the epidemiology and control of sexually transmitted disease (STD) (WHO, 2001; Hart, 1993). An understanding of the impact and spread of *Candida* infections among women in a locality will be of immense benefit in the management of gynecological problems with similar or closely related presentations especially in the symptomatic cases (Spinio et al., 1995; Sobel, 1990). It would also constitute a guide towards assessing the depth of other sexually transmitted infections in the community and hence their control.

Most of the time *Candida* infections of the mouth, skin, and vagina occur for no apparent reason. A common cause of the infection may be the use of antibiotics that destroy beneficial and harmful microorganisms in the body permitting *Candida* to multiply in their place which result to a condition known as Candidiasis, it is called oral thrush when it grows in the mouth especially infants shows up in the skin as red, inflamed and sometimes scaly rash which result to vaginitis commonly known as yeast infection in the vagina, it causes *Candida* onychomycosis in the nails or paronychia next to the digestive tract. *Candida* infection of the penis is more common among uncircumcised than circumcised men and may result from sexual intercourse from infected partner. In rare instances when body resistance is low as in leukemia or diabetes mellitus, the organism (*Candida albicans*) can enter the blood stream and cause serious infections of vital organs in the body (McCormack et al., 2006).

The rate of invasive Candidiasis has increased substantially over the past years, there is high incidence rate of *Candida albicans* in pregnant women (Isibior et al., 2011). Population identified those who are immune-deficient because of disease conditions like HIV underlying conditions such as malignancy, burns, hematological disorders, solid organ and bone marrow transplantation. Also at risk are very low birth weight infants (birth weight <1500g) and infants cared for in their neonatal intensive care units. The most common manifestation of *Candida* spp infection in neonates is an increasingly important problem that may be associated with morbidity and mortality (Hunter, 2009). Prevention of Candidemia in neonates has been aided by the identification of specific risk factors. Some of these include the rate of colonization, which is higher in pregnant women than non-pregnant women. The use of peripheral venous catheters, use of broad spectrum antimicrobial agents, low birth weights, arterial or venous catheters and parenteral nutrition have been identified as risk factors for neonates (Stamos and Rowley, 2007).

The disease condition of the infection is usually vaginal discharge which could be generally profuse thick odourless, whitish profuse, yellow or light green prulent discharge, other symptom included include Vulva itching, dysuria (Ching, 2002). Candidiasis is associated with vaginal discharge and pruritis. The discharge appears to be like curded milk and deep erythma of vulva and vagina is often seen (Khan *et al.*, 2009) [13]. The vaginitis is characterized by a whitish or yellowish discharge, inflammation of the walls of the vagina and of vulva (external genital area) causes burning and itching (Braun *et al.*, 2005) [6]. An infection of the blood stream may affect the kidneys, heart, eyes, lungs or other organs causing high fever, chills anemia and sometimes a rash or shock. Candida can cause the following problems depending upon the organ infected (Braun *et al.*, 2005) [6].

There are several consequences associated with the vaginal Candidiasis, in his review on infections associated with pregnancy Adam (2012) [11] stated that in non-pregnant women with normal immune system, yeast infections rarely result in serious complications. Even pregnancy. Yeast infections usually do not cause adverse effects for either the mother or her pregnancy. However, when a woman is immune-compromised (immunodeficiency). Candida infection may cause severe gastrointestinal tract infection and may even spread to the blood stream, which can be serious and potentially fatal.

Successful therapy of Candida infections depends on identification and proper management of underlying predisposing factors. The underlying disturbance can be corrected, the body usually deal with the yeast and treatment will however shortens the process. The treatments used to manage Candida infection, the patients underlying disease and immune status the Patients risk factors for infection, the specific species of Candida responsible for infection and in some cases the susceptibility of the Candida species to specific antifungal drugs. (Pappas *et al.*, 2009) [19]. Most Candida infections can be treated with antifungal drugs such as Clotrimazole ministration drugs such as Clostrimazole, Miconazole, Nystatin or oral administration of drugs such as Fluconazole and amphotericin B. however many women prefer a single oral dose of Fluconazole for vaginal Candidiasis rather than topical creams, more serious infection may need intravenous medication given at the hospital. Although antifungal drugs usually clear up the problem, the infection can re-Occur sometimes as a result of re-infection by a sexual partners. Hence, treatment of both partners is sometimes necessary. if possible, use of antibiotics should be discontinued during a Candida infection for diaper rashes, use barriers creams and change the diaper frequently. People with a tendency to skin Candidiasis should keep their skin dry.

The study will provide more constructor framework to the formation or creating a way of eradicating the infection (Candidiasis). It will also help to educate the people on the causes and consequences of the infection, it will also help the university to know the risk factor that makes people susceptible to infection, it will help to provide precautionary measures that will help in preventing the infection.

Finally this research work will help to reduce the high rate of the disease occurrence and gives and insight into communities our communities.

Materials and Methods

Study area and Sample Collection

The study was conducted on Fifty-Five (55) female students of Imo State University that visited a selected medical laboratories in Owerri Municipal Local Government Area, after obtaining informed consents, personal biometric data were also documented.

An aggregate number of fifty-five (55) high vagina swabs (VS) Were collected from female students in Imo State University Owerri (IMSU) aged between 18 and 26 years using a sterile swabs sticks. The samples were collected from the students between October to December, 2020. Sterile swab sticks were used by trained personnel to swab the inner vaginal epithelium of the student and was taken to laboratory for immediate diagnosis and analysis using an already prepared Sabouraud Dextrose Agar (SDA) media contained in disposable petridishes.

Data Analysis

Data generated from this research was analyzed using descriptive statistics such as percentage, chi square and Fischer exact test.

Sample Culture

The samples (high vaginal swab) were inoculated on to the already prepared Sabouraud Dextrose Agar (SDA). The plates were then incubated for 1-2days (24-48 hours) at 35-37°C in ambient air atmosphere, after incubation the disposable petridishes were examined for colonies that were normally of *Candida albicans* characteristics e.g budding yeast, pseudohyphae with creamy-whitish oval raised shape growth, with a smooth border and a pasty and moist consistency Were observed.

Media Preparation

To prepare 1000ml of the media according to the prescription of the manufacturer, 65g of Sabouraud Dextrose Agar (SDA) powder was weighed with weighing scale, dissolve in 1000ml of distilled water the mixture was shaken very well to dissolve and sterilized by autoclaving at 121°C for 15 minutes after covering the conical flask mouth with cork while making sure that it was not over heat, after autoclaving, it was allowed to cool to 45-50 minutes. It was then poured aseptically into sterile disposable petri dishes for solidification.

Staining (With Lactophenol Cotton Blue) Mount

For further identification and conformation of *Candida albicans*, the preparation was stain with lactophenol cotton blue (L. C. B). a drop of lactophenol was dropped on a clean glass microscope slide; a small portion of the isolate was harvested and placed into the drop of lactophenol and rock to mix using a wooden rod, a clean cover glass was then used to cover the suspension, making sure there are no air bubbles. It was then observed microscopically using 10x and 40x objectives. *Candida abicans* will stain light blue with sprouting yeast cells growth (Larone, 2011).

Germ Tube Test

For proper identification and confirmation of *Candida albican*, the germ tube test was employed according to the method of Cheesbrough (2006). Test tubes were labeled, using a pasteur pipette, 500ul (0.5mi) of human serum was transferred into the test tube using a sterile wire loop, the serum was inoculated with a yeast colony from the culture plate and then, the test tube was placed in an incubator at 35-37 degree Celsius for 2-4 hours, after incubation, a drop of the serum yeast culture was transferred to a glass slide using a Pasteur pipette, and covered with a cover glass. he preparation was then examined using the 10x and 40x objectives with the condenser iris diaphragm closed sufficiently to give good contrast, looking out for sprouting yeast cells i.e tube like out growth.

Results

Aged Group-Related Prevalence of Vaginal Candidiasis

Results from the findings reveal that the age group 18-20 had the highest prevalence of Vaginal Candidiasis of 18.18%, while age group 24-26 had the least rate of 12.72% as shown in Table 1 and figure 1 below.

Table 1: Age Distribution of Vaginal Candidiasis

Age Group	No Positve	No Negative	Prevelence (%)
18-20	10	12	18.18 %
21-23	8	10	14.55 %
24-26	7	8	12.72 %
Total	25	30	45.45 %

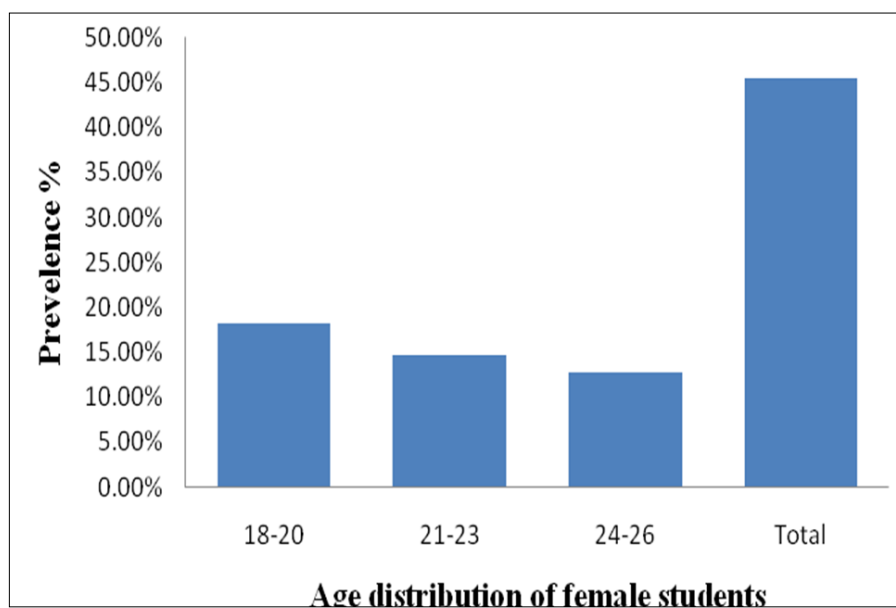


Fig 1: Age related prevalence of infection

Hostel Location Related Prevalence of Vaginal Candidiasis

Results from the findings shows that female students in IMSU living in Hostels located in front gate had the highest prevalence of Vaginal Candidiasis of 20%, while IMSU female students living in hostels located in Aladinma had the least prevalence of 10.9% as shown in Table 2 and Figure 2 below.

Table 2

Hostel	No Positive	Prevalence (%)
Front gate	11	20 %
Works Layout	7	12.72 %
Aladinma	6	10.9 %
Total	24	43.62 %

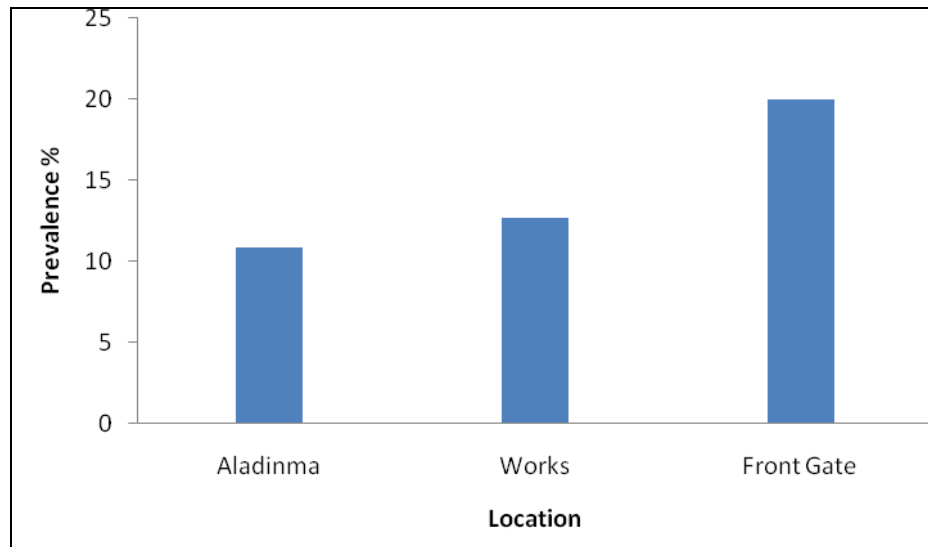


Fig 2

Discussion

Candida species were identified as most predominant in female Students out of fifty-five (55) female students screened, twenty-five (25) were found to be infected with *Candida*. 25 out of 55 high vaginal Swab(HVS) proved to be positive carriers of *Candida albicans* after all the necessary diagnosis which constitute between the age of 18-20 years old, 21-23 years old and 24-26 years old, this agree with the result obtained by Ching (2002) and Reamy *et al.*,(2000). The prevalence reported in female students aged between 18-20 years is significant when compared with that of the students aged between 21-23 and 24-26 years. This is also in agreement with Ching (2002) that physiological changes could influence the prevalence rate of candidiasis, however the risk factor that may be incriminated to female students aged 18-20 years old in Imo State University Owerri (IMSU) as compared to other female students in advanced countries may be due to poor personal hygiene, poor hospital sanitation and indiscriminate use of antibiotics etc.

If there is a high level of sugar in the urine this sugar favours the growth and multiplication of Vaginal *Candida* spp. This high level of sugar is caused by increase in glucose concentration as occurs in diabetes mellitus, during treatment with glucosteriodes which promotes fungal growth without necessary inducing tissue invasion, treatment with certain antimicrobial agent example tetracycline also increases the amount of glucose available for fungal growth by reducing the number of bacterial cable of competing for glucose (Pescitelli *et al.*, 2000). Also other causes of Candididasis in female could be penicillin,tetracycline, gentamycin, ofloxacin, chloramphenicol, among others might have reduce the bacterial flora of the vagina and consequently, *Candida* species being opportunistic pathogens coonize the vagina. Furthermore Candidiasis could be result from the change in ph of the Vaginal region to acidic ph(<7) favours the growth and proliferation of *Candida albicans*.

According to National Health Service (NHS) in UK approximately 30% of women who takes synthematic or intravaginal antibiotic develop thrush; however simple hygiene and good sanitary conditions can be of great help in reducing this prevalence of Candidiasis not only among the students but throughout the state.

Conclusion and Recommendation

The findings in this research work revealed that there is high rate of vaginal Candidiasis in female students also the study also establish the fact that the prevalence and distributions of *Candida albicans* among female students are dependent on the following factors, age and location of the subjects owing to the effects of the infection due to unhygienic environments and antibiotics drug abuse, finally there should be adequate hygiene in our environment especially those female hostel, there should also be a mandatory HVS screenings for students living in the hostel

Conflict of interest

The authors declared that there is no conflict of interest regarding the publication of this manuscript.

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