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Candidiasis Opportunistic Mycosis within Nigeria: A Review

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Abstract
Candidiasis as a disease is sometimes synonymous with woman folk and most human immunodeficiency virus (HIV) infected individuals. But the disease generally has no border, as it affects males, females, old, young and middle age persons. Environmental changes encourage over-growth of the opportunistic pathogens *Candida* spp. The review aimed to assess different presentations of diseases due to *Candida* species in some states in Nigeria, covering Northwest, South-west, South-south and South-eastern parts of the country. Data was obtained through literature search of work from previous researchers. It was observed based on the review that candidiasis is a factor of many different species of the genus *Candida* but *Candida albican* is the predominant cause of the illiness, with other non *albican Candida*, contributing the remaining percentage. It was also discovered that HIV infection, pregnancy, diabetis abuse of antibiotics and generally immunocompromise status are among the predisposing factors of the disease. It was also discovered that age group of 20-30 which is an active age group in women are more prone to candidisis.
Key words: Candidiasis, Mycosis, Opportunistic infection, Women

INTRODUCTION

The genus Candida belongs to the class Ascomycetes, which is predominantly forming unicellular yeast-like cells and in some cases, mycelia (Stafford 2000; Carlsen, 2001). They are polymorphic, oval, Gram positive, budding yeast cell, that produces pseudohyphae both in culture and in tissues and exudates (Chakrabati and Shivaprakash 2005). *Candida* species also exhibit filamentous mycellial morphology in the saprophytic phase, but they however, have typical yeast morphology in the parasitic phase, when grown at 37˚C in the laboratory and in tissue (Chakrabati and Shivaprakash 2005). They usually produce pseudohyphae when their buds continue to grow undetached from one another, producing chains of elongated cells that are pinched or constricted at the septation lines between cells (Calderone and Fronzi, 2001).

Candida species produces thick-walled resting cells 7 to 17 mm in diameter, called chlamydospores, when grown at temperatures below 26˚C in nutritionally poor media such as cornmeal agar (Jha *et al.*, 2006). They are members of the normal flora of the mucous membranes in the upper respiratory, gastrointestinal, and female genital tracts (Segal *et al.*, 2005). Nowadays, due to the increase in the number of immunocompromised patients, as a result of chemotherapy and/or HIV/AIDS, has resulted in a parallel increase in the number of opportunistic infections, especially those due to *Candida* species (Juliana, 2004; Binesh and Kalyani, 2011).

It was also documented that maternal complications in candida infections mostly correlates with immunological status of host (Duerr *et al.*, 2003), and the infection is one of the commonest fungal dieases associated with HIV-infection in women (Ogunshe *et al.*, 2008; Ocheni *et al.*, 2000).

Candida species are notably part of human flora, it becomes pathogenic under certain conditions and in that case, the disease caused is called opportunistic infection (Eloy *et al.*, 2006). As far as this genus is concern, the major etiological agent is *Candida albicans*, but other different *Candida* species can also cause a variety of infections, they include *C. tropicalis*, *C. parapsilosis*, *C. krusei*, *C. guillermondii*, *C. glabrata*, and *C. kefyer* (Kamiya *et al.*, 2005)

The term Candidiasis is a primary or secondary mycotic infection due to members of the genus *Candida* (Anaissie *et al.*, 2003).

Vulvovaginal candidiasis (VVC), referred to as vaginal yeast infection, is a common gynaecologic disease that affects three out of four women in their lifetimes and > 40% of them may have more than one episode later, and the case is more common in pregnancy (Eschenbach 2004; Das Neves *et al.*, 2008).

It has been documented that higher estrogen as well as glycogen levels in vaginal secretions during pregnancy increases woman's chance of developing VVC (Monif and Baker 2003).

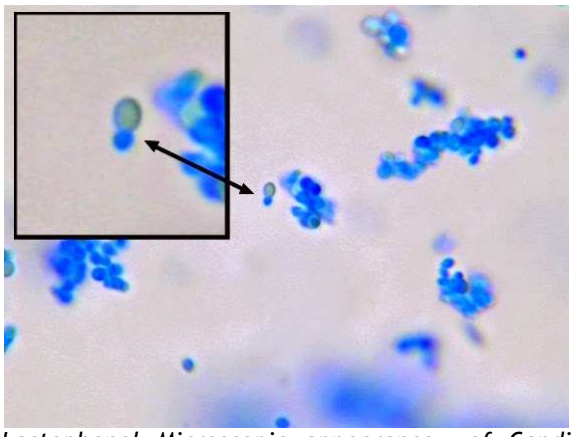
The yeast infections, particularly the vaginal candidiasis is one of the most common fungal diseases normally reported in pregnant women, which may cause systemic infections in neonate especially in low birth weight and prematurity after delivery (Mendling and Brasch, 2010).

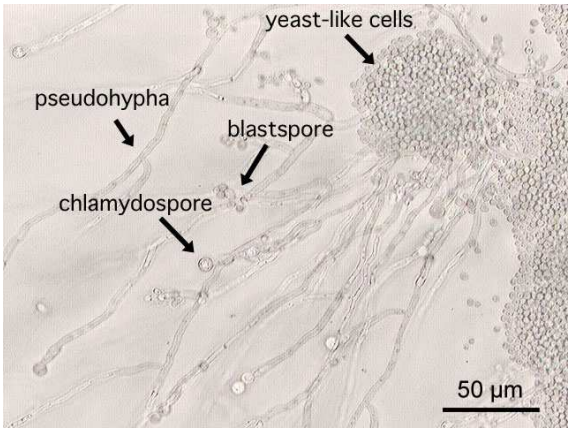
Based on literature, it has been hypothesized that screening for and treatment of common vaginal infections has the tendency of reducing the rate of preterm birth among affected women (Hollier, 2005).

Candida genus encompasses more than 160 species. The organism variously can be found among humans, other mammals, insects, birds, fish, arthropods, animal waste, plants, mushrooms, honey, necter, fresh water, sea water and in the air, it is listed by the center for disease control (CDC) as a cause of sexually transmitted disease (Prescott *et al.*, 2008).

According to one study, 14 African *C. albicans* isolates with unusual phenotypes and two others from two German patients were proposed as representative of a new *Candida* species called *Candida Africana* (Tietz e*t al.*, 2001). Phenotypically, *C. africana* resembles *C. albicans,* or/and *C. dubliniensis,* although some morphological and biochemical characteristics are clearly different. In fact, *C. africana* isolates form germ tubes in serum but fail to produce chlamydospores on corn meal agar (CMA) and they are also unable to assimilate N-acetylglucosamine, glucosamine, trehalose and DL-lactate (Tietz *et al.*, 2001). But, on the basis of genetic evidence, *C. africana* cannot be treated as a separate species from *C. albicans* even if it represents the most evolutionary divergent type so far described with a marked propensity to cause mainly vaginal candidiasis (Odds, 2010; Romeo and Criseo, 2011).

Blood stream infection of the Neonates caused by *Candida* species in the premature infants with low birth weight has been shown to be successfully treated with amphotericin B (Baradkar *et al.*, 2008). Dissemination of *Candida* through bloodstream sometimes occurs in infants because of their immature immune systems, compounded by their relatively compromise developing skin and mucosal membrane defenses barrier, in the end they are often difficult to eradicate in the preterm infants (Kaufman *et al.*, 2006). Very low birth weight (VLBW) infants (< 1500 g) are also at high risk for invasive fungal infections and highest for infants born at the youngest gestational ages who survive past the immediate postnatal period (Kaufman, 2014). Due to candida infection, a tendency towards spontaneous preterm birth reduction among women with asymptomatic candidiasis treated with clotrimazole usually exist (Rasti *et al.*, 2014).





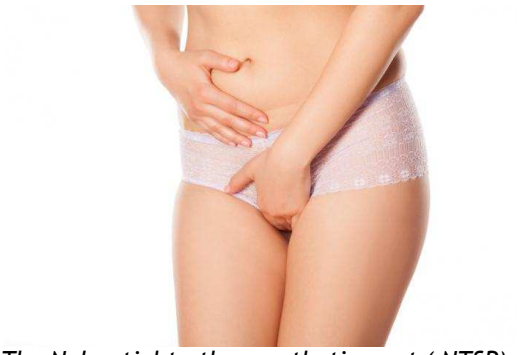
Lactophenol Microscopic appearance of Candida Marian Nichols 2019 *KOH Microscopic appearance of Candida spp, Y. Tambe 2005*

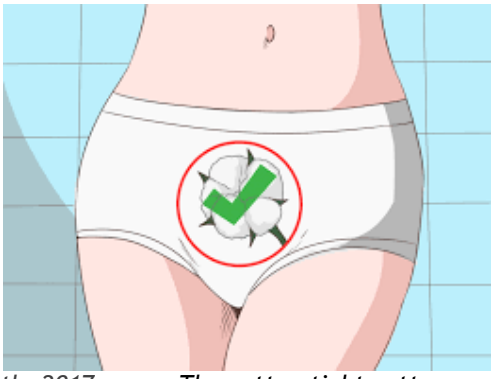
An overview/Analysis of candidiasis in some major cities in Nigeria

In a study involving 200 participants in the capital city of Nigeria, Abuja (Emeribe *et al.*, 2015), reported that, 28 of the total had *Candida*-positive cultures from both HVS and ECS samples used, representing the prevalence of 14.0% of Vulvoviginal candidiasis (VVC). According to the study, the age-group 20–30 years had the highest candida positive culture 17(8.5%) while the age group with least positive culture were less than 20 years and greater than 40 years of age.

It was also discovered that women who presented with clinical symptoms of ill health and those who were apparently healthy and voluntarily came for the study (with no clinical presentations of ill health) had equal *Candida*-positive cultures. Because, of 83 subjects who presented with one or more clinical symptoms of ill health, 14(16.9%) of them had candidiasis. Similarly, of 117 women who voluntarily participated (those with no clinical symptoms of ill health), 14(11.9%) had candidiasis also.

In Uyo, Akwa Ibon state, of the southsouth, Nigeria, a study involving women who uses nylon tight/other synthetic pants (NTSP) and others on cotton tight/cotton pants (CTCP) showed an overall incidence rate of vulvovaginal candidiasis in the two groups (NTSP and CTCP) as 61.8% (118 of 191). The respective incidence rate for those who wore CTCP and NTSP were 42.86% and 76.80 respectively. While the relative incidence of acute abnormal vaginal discharge among the involved subjects were 25.7% (18 of 191) and 82.64% (100 of 191) for women on cotton tight/cotton pants (CTCP) and nylon tight/other synthetic pants (NTSP) respectively. As part of the results obtained, recurrent abnormal vaginal discharge was found to be 25.7% (18 of 191) and 1.43% (1 of 191) for women on NTSP and CTCP, respectively. *C. albican* was isolated from 76.86% (93 of 121) of women on NTSP against 42.86% (30 of 70) of women on CTCP as against other agent recovered *Trichomonas vaginalis* was isolated from 23.14% (28 of 121) of women on NTSP and 17.14% (12 of 70) CTCP. *Neiseria gonorrhea* was isolated from 4.96% (6 of 121) of women on NTSP and 2.86% (2 of 70) CTCP (**Akpan** *et al.*, 2011)



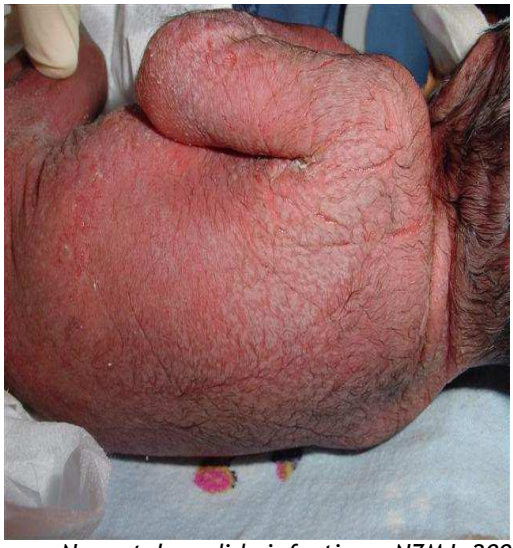


The Nylon tight other synthetic pant (NTSP), *Lori Smith, 2017* *The cotton tight cotton pant (CTCP),* *American College of Obstetricians and Gynecologists: "Vaginitis: Causes and Treatments." 2019*

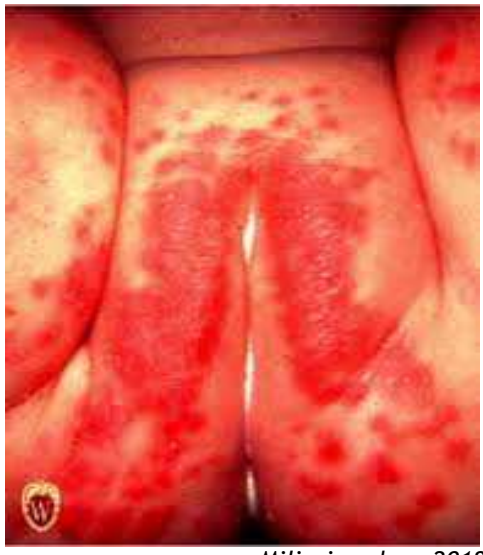
Ugwa, (2015) in Kano, had a study on 300 women, out of which 30 were drop-outs due to consent issues with husband and 90% (270/300) completed the study. The culture in many parts of Northern Nigeria is that the husbands consent is required about aspects of the woman's reproductive and sexual health. According to his findings, vulvovaginal candidiasis (VVC) constituted 84.5% of all HVS specimens which represents a significant percentage and therefore of public health concern.

Nnadi and Singh, 2017, study on prevalence of genital *Candida* species among pregnant women attending antenatal clinic in a tertiary health center in North-west Nigeria, they discovered that, of the 288 pregnant women involved in the study, 175 were found to be positive for candidiasis while 113 were negative, resulting in prevalence rate of 60.76% in the study population. According to the outcome, vulvovaginal candidiasis (VVC) was most prevalent within the age bracket of 21–30 years 43.1% (124/288) and the prevalence relatively reduces after the age of 35 years of age according to the findings. The peak prevalence was found among pregnant women aged 26–30 years 37.1% (65/175). Another important finding was with regards to parity issue, in which distribution showed that 86(29.9%) were primigravidae while 202(70.1%) were multigravidae. Similarly, VVC prevalence was affected by the trimester of pregnancy, as it showed a progressive increase with the duration of pregnancy. A high prevalent rate of 52.7% (152/288) was observed in the 3rd trimester of pregnancy as against the rates of 0.69% (2/288) and 6.94% in the first and second trimesters, respectively. According to the findings also, *C. albicans* was the most prevalent species isolated in 73.7% (129/175) of the subjects while the rest 26.3% (46/175) were non *albicans Candida* (NAC) species.

In a 4year study in Lagos, Ezenwa *et al*. (2017), work on a total of 2,712 newborns, of which 1,149 (42.4%) were preterm and 1,563 (57.6%) were term babies. From these, 1182 samples (43.6% of neonatal admissions) were collected from babies with clinical features suggestive of sepsis. In the study, Eight hundred and twenty‐three (69.6%) were blood cultures, 252 (21.3%) were CSF cultures while 107 (9.1%) were urine cultures. There were also 711 cultured samples from male and 471 from female neonates. It was discovered that, twenty‐seven (2.3%) out of the 1182 cultures yielded fungal agents and were identified as *Candida spp*. Fifteen of the positive fungal cultures were from male infants with a male:female ratio of 1.3:1. From the study, all the 27 positive *Candida* cultures were from neonates who met the criteria for invasive candida infection (ICI). As such the prevalence of ICI in this study was 2.3% of the septic neonates. The research also revealed that, there were 21(77%) *C. albicans* and six non‐*albicans*, of which two were *Candida krusei*. Twelve (44.4%) of the 27 *Candida* positive neonates were preterm among.



Neonatal candida infections: NZMJ, 2005



Miliaria rubra, 2018

In what seems like multiaetiologic agent analysis in Cross rivers, Usanga *et al*. (2009) worked on 562 pregnant subjects and 108 non-pregnant ones, 250(44.5%) and 51(47.2%) were infected with various aetiologic agents respectively. It was observed that in pregnant women, *Candida albicans* had the highest infection rate 121(21.5%), followed by HIV 38(6.8%) and *Chlamydia* species, 35(6.2%). Others were *Trichomonas vaginalis* 29(5.2%); *Gardnerella vaginalis* (Bacterial vaginosis) 12(2.1%); Hepatitis B Surface Antigen (HBsAg); 8(1.4%) and *Treponema pallidum* (syphilis) 7 (1.2%). *Nesseria gonorrhoea* was not isolated. In the non -pregnant women, *Candida albicans* also had the highest prevalence rate 23(21.3%) followed by *Chlamydia* species 11(10.2%); while others in the category were: HIV 9(8.3%); *Trichomonas vaginalis* 4(3.7%); Hepatitis B surface antigen (HBsAg) 3(2.8) and *Gardnerella vaginalis*, 1(0.9). *Neisseria gonorrhoeae* and *Treponema pallidum* were not isolated among women in that group.

Aniebue *et al*., 2018, in a study that used diagnosis based on clinical evaluation compared to added laboratory culture, had sixty five of 209(31.1%) participants that had symptoms suggestive of vulvovaginal candidiasis (VVC), 54(25.8%) had clinical-based diagnosis of VVC (when symptoms and findings on clinical examination was considered), while 155(74.25%) participants had not. Forty three 43(20.6%) had culture-positive laboratory results of which 37(17.7%) presented with symptoms and 6(2.9%) had none. The prevalence of VVC was 17.7% calculated on the basis of symptoms and culture-positive results; while asymptomatic *Candida* colonization was 2.9%. But only 26(12.4%) of those with clinical-based diagnosis had positive laboratory culture of *Candida*, as such 11(false negative) of 37 culture-positive cases with symptoms were missed by clinical-based diagnosis. Also 28 (false positive) of the 54 clinical-based diagnosis of VVC were not confirmed by laboratory cultures according to the findings.

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