Prevalence of *Candida albicans* Amongst Women Attending Health Centres In Abeokuta, Ogun State, Nigeria

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ABSTRACT: In this study, the prevalence of *Candida albicans* amongst women attending antenatal and gynecology health centres in Abeokuta, Nigeria was investigated. Two hundred and fifty high vaginal swab (HVS) specimens were collected from symptomatic and asymptomatic pregnant and non-pregnant women ages 16-50 years attending antenatal and gynecology health centres in Abeokuta. These specimens were analyzed using standard microbiological methods. Wet preparations were examined microscopically for presence of yeast cells. The swabs were inoculated on Sabouraud Dextrose agar and incubated at room temperature and at 37°C for a few days. Of the two hundred and fifty specimens analyzed, 135(54.0%) were symptomatic patients while 115(46.0%) were asymptomatic patients. The overall prevalence of *Candida albicans* was 24.4% (n= 61). Of the 135 symptomatic women 36(26.7%) had *Candida albicans* while 25(21.7%) of the 115 asymptomatic women also had *Candida albicans*. This study revealed that candidiasis caused by *C. albicans* is still the major health problems among females in this locality. The need for regular check-up at the clinics as well as personal hygiene is highly recommended in order to forestall avoidable complications.

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1. INTRODUCTION

The genital tract is the portal of entry for numerous sexually and non-sexually transmitted diseases. A number of bacterial and non-bacterial infections exist that affect the female reproductive tract and cause vaginal discharge. Vaginal discharge is a common symptom in primary health care and is often the second most common gynecological problem after menstrual disorders. Most women regard any secretion from the vagina as abnormal discharge and the first task for primary health care providers is to ascertain whether it is pathological or physiological. There are few women who complain of vaginal discharge, discomfort or odour without any objective finding (Dodson and Friedrich, 1997). Such women may be motivated by a neurotic fear of uncleanliness, guilt concerning sexual activities, or anxiety about venereal disease, whether or not sexual exposure has actually taken place. A number of vaginal infection present with few or no symptoms and yet produce serious effect and can be transmissible to other people.

The non- bacterial pathogens associated with vagina infection are *Trichomonas vaginalis, Gardnerella vaginalis*, and fungi like *C. albicans* and viruses like Herpes Simplex Virus. Others include *Bacteriodes* spp, *Chlamydia trachomatis, Listeria monocytogenes*, and β- hemolytic streptococci (Cheesbrough, 2000). Candidiasis is the most common opportunistic fungal infection (Hedayati and Shafiei, 2010). Vaginitis is one of the principal motives that lead women to seek out an obstetrician or gynecologist. Candidiasis is responsible for 90% of the cases of infectious vaginitis (Adad et al., 2001). Vulvovaginal candidiasis (VVC) is a fungal infection of the female lower genital tract-the vulva and the vagina, caused by *Candida species* (Sobel, 2007; Akah et al., 2010). *Candida* is the fourth most common cause of nosocomial bloodstream infection in the United States (Pappas et al., 2009). *Candida* species that cause vaginitis most often are C. *albicans,* C. *g/abrata* and C. *tropicalis. Candida* spp. that rarely causes infection includes C. *parapsilosis,* C. *pseudotropicalis,* C. *krusei,* C. *guilliermondi* and C. *stellatoidea* (Cronje et al., 1994).

The bacterial flora of the female genital tract is diverse and varied; normally aerobic lactobacilli appear in the vagina soon after birth and persist as long as the pH remains acidic (Cruickshank and Sharman, 1994) and more acidic (pH 4.5) during early month of pregnancy. The lactobacilli are suppressed

by the administration of antimicrobial drugs; yeast or various bacteria increase in number and cause irritation and in most cases inflammation (Barlette et al., 1999).

Several factors can be associated with increased rate of vaginal colonization by *C. albicans*: these include pregnancy, use of high oestrogen content and oral contraceptives (Akah et al., 2010; Alli et al., 2011), uncontrolled diabetes mellitus (CDC, 2002; Alli et al., 2011), prolonged use of broad spectrum antibiotics (Mardh et al., 2002; Alli et al., 2011) which kill the good and beneficial bacteria, allowing yeast overgrowth, poor dietary habits and poor personal hygiene. Many practitioners believe that nylon underwear and tight insulating clothing predispose to vaginal candidiasis by increasing the temperature and moisture of the perineum (Nwankwo et al., 2010; Alli et al., 2011). A study among African women wearing tight clothes reported a higher prevalence of *Candida albicans* in Vulvovaginal candidiasis than those wearing loose clothing (Alli et al., 2011). The same observation was made in the study by Nwankwo et al. (2010), where regular users of tight clothings had 88.2% of *Candida albicans* and occasional and non wearers had 68.6% of *Candida albicans*.

Poorly supported risk factors include use of sponge, intrauterine devices (IUDS), diaphragms, condoms, orogenital sex, douching and intercourse (Mardh *et al.,* 2002, Reed et al., 2003; Alli et al., 2011) and diet with high glucose content (de Leon et al., 2002; Akah et al., 2010; Alli et al., 2011). Indeed, evidence in favour of sexual transmission exists. For instance, penile colonization is four times more frequent in male partners of women affected with VVC (McClelland *et al.,* 2009; Alli et al., 2011) and infected partners commonly carry identical strains which orogenital transmission has been documented (Akah et al., 2010; Alli et al., 2011).

The common features of vaginal infections is that at some stages, they all produce lesions at the site of infection usually in or about the external genitalia and these lesions are highly infective to the male sexual partners (Muir's, 1985). Pelvic inflammation diseases, sexually transmitted infection and reproductive tract infections continue to exert a tremendous health burden on women in developing countries. Poor social economic status, inadequate knowledge, lack of diagnostic facilities and shortage of effective treatment all contribute to the high incidence of sexually transmitted and reproductive tract infections (Tyadal et al., 1992; Burrow and Bueshing, 1999). In this study, we investigated the prevalence of *C. albicans* amongst women attending antenatal and gynecology clinics of health centres in Abeokuta, Nigeria.

2. MATERIALS AND METHODS

2.1. Collection of samples

Two hundred and fifty (250) high vaginal swab (HVS) specimens were collected from both symptomatic and asymptomatic pregnant and non-pregnant women (aged 16 - 50 years) attending ante-natal and gynecology health centres in Abeokuta, using sterile swab sticks. The characteristic features of the symptoms include foul smelling odour, vaginal discharge (scanty or purulent), burning sensation and pain during urination, as well as itching and irritation of the vagina. The samples were labelled and taken to the laboratory immediately for analysis.

2.2. Wet preparation

About 1 ml of normal saline was put in the tube containing the swab to cover the cotton bud, shaken and allowed to stand for some minutes. A drop of this was placed on a clean grease- free slide and was viewed with low power objectives (10× and 40×) for yeast cells. Germ tube test was also carried out on suspected yeast colonies and positive colonies were sub-cultured onto corn meal agar medium for further identification by the formation of chlamydiospore by *C. albicans*.

2.3. Microbiological analysis

All the specimens were streaked on prepared Sabouraud Dextrose agar (SDA) plates. The plates were incubated at room temperature and at 37°C for 3-4 days. Colonies were sub-cultured on MacConkey agar to obtain pure cultures. Other colonial morphology, gram staining and biochemical reactions were used to identify the isolated organisms.

2.4. Data Analysis

The study was carried out and the proportion of subjects with *Candida albicans* was calculated. The prevalence of *C. albicans* was cross tabulated with age, clinics and clinical manifestation using SPSS 19.0 window packages. Relevant chi-square statistics were computed to accompany each cross tabulation. Significance of the prevalence of *C. albicans* was determined by X^2 at $p<0.05$.

3. RESULTS ANALYSIS

Of 250 high vaginal specimens examined, 61(24.4%) had growth of *Candida albicans*. Of the sixty-one isolates of *Candida albicans,* 22(17.6%) isolates were from gynecology clinic attendees while 39(31.2%) isolates were obtained from antenatal clinic attendees. This difference was significant ($p<0.05$). Prevalence of *Candida albicans* in to clinics used in this study is shown in Table 1.

Table 1: Prevalence of *Candida albicans* in relation to clinics

Clinics	No. *C. albicans* (%)
Gynecology	22 (17.6)
Antenatal	39(31.2)
Total	**61(24.4)**

Table 2 shows prevalence of *C. albicans* isolates in relation to ages of subjects. Women within age group 16-30 years [40(28.2%)] had higher prevalence of *Candida albicans* isolates than their counterparts in age group 31-50 years [21(19.4)]. There was also significant difference ($p<0.05$) in relation to age of subjects.

Table 2: Prevalence of *C. albicans* isolates in relation to ages of subjects.

Age groups (years)	Number of patients (%)	Number of isolates (%)
16 – 30	142(56.8)	40(28.2)
31-50	108(43.2)	21(19.4)
Total	**250(100.0)**	**61(24.4)**

Table 3 shows prevalence of *C. albicans* in relation to clinical manifestations. Of the 250 subjects examined, 135(54.0%) were symptomatic while 115(46.0%) were asymptomatic. Symptomatic women had 36(26.7%) higher prevalence of *C. albicans* compared to asymptomatic women 25(21.7%). However, this difference was not significant ($p>0.05$).

Table 3: Prevalence of *C. albicans* in relation to clinical manifestation

Clinical manifestation	Number of patients (%)	Number positive (%)
Symptomatic	135(54.0)	36(26.7)
Asymptomatic	115(46.0)	25(21.7)
Total	**250(100.0)**	**61(24.4)**

4. DISCUSSION

Vaginal discharge is one of most frequent gynecological problems encountered in females especially during their reproductive stage. In this study, the overall prevalence of *C. albicans* was 24.4%. Candida species are part of the lower genital tract flora in 20-50 % of healthy asymptomatic women (McClelland *et al.,* 2009; Akah et al., 2010; Donbraye-Emmanuel et al., 2010; Alli et al., 2011). Carrier rates are usually higher in women treated with broad spectrum antibiotics (Singh, 2003; Alli et al., 2011), pregnant women, diabetic women (Donders, 2002; de Leon et al., 2002; Donbraye-Emmanuel et al., 2010; Alli et al., 2011) and women with HIV/AIDS (Reed *et al.,* 2003; Duerr et al., 2003; Akah et al., 2010; Donbraye-Emmanuel et al., 2010; Alli et al., 2011). This 24.4% reported in this study are in conformity with the fact that *Candida albicans* is both the most frequent colonizer and responsible for most cases of vulvovaginitis (Singh, 2003; Akah et al., 2010; Donbraye-Emmanuel et al., 2010; Alli et al., 2011).

The overall carrier rates observed for *C. albicans* in this study was 24.4%. Although, *C. albicans* been less common than bacterial infections, serious fungal infections occur in the immunocompromised patient both as new infection and as reactivation of latent disease (Shailaja et al., 2004; Donbraye-Emmanuel et al., 2010; Alli et al., 2011). The percentage reported for *Candida albican* (24.4%) in this study is higher compared to what was reported by Choudhry et al. (2010), who reported *Candida* to be 2.0% in their study. It is also higher than the 2.20% reported by Konje et al. (1991) in Ibadan. It is slightly higher than the 23.0% reported by Klufio et al. (1995) among pregnant women presenting to Port Moresby General Hospital, Papua New Guinea in 1990-1991 and the 23.9% reported by Murta et al. (2000) among women without human papilloma virus (HPV) infection. It is higher than the 22.1% reported by Anorlu et al. (2004) among women in Lagos University Teaching Hospital, Lagos, Nigeria. It is higher than the 21.5% and 21.3% reported by Usanga et al. (2010) among pregnant women and non-pregnant women respectively in Calabar, Nigeria. The percentage reported for *Candida albican* (24.4%) in this study is also higher than the 12.0% reported by Nwokedi and Aniyam (2003) in similar study. It is higher than the 2.6% and 6.7% reported by Cronje et al. (1994) among rural women and urban women respectively in Orange Free State, South Africa; the 0.5%, 17.3% and 22.5% reported by Adad et al. (2001) among the cytology tests in 1968, 1978 and 1998 respectively. It is also higher than the 17.8% reported by Di Bartolomeo et al. (2002) among adult group in their study.

However, it is lower than the 60.0% and 40.0% reported for candida colonization and/or infection among pregnant women by Alli et al. (2011). It is also lower than the 26.0% reported for candida colonization and/or infection among pregnant women by Donbraye-Emmanuel et al. (2010). The percentage reported for *Candida albican* (24.4%) in this study also disagrees favourably with the finding published by Sobel et al. (1998) who reported a prevalence of 60.0% in their study. It is also lower than the 40.0% reported by Oyewole et al. (2010) among non-HIV-infected women in Sagamu, Ogun state, Nigeria. It is lower than the 29.7% reported by Hedayati and Shafiei (2010) in their study. It is lower than the 33.6% reported by Adeoye and Akande (2007) among women at LUTH and Military Hospital, Lagos. In another study, the prevalence of vaginal candidiasis in pregnant women was only 28.0% with *Candida albicans* being implicated in more than 90.0% of the cases (Donbraye-Emmanuel et al., 2010; Alli et al., 2011).

The percentage reported for *Candida albican* (24.4%) in this study was also lower than the findings published by some other workers (Khan et al., 2009; Muvunyi and Hernandez, 2009) who reported a prevalence rate of 28.0 and 52.5% respectively. This is comparatively lower than the 78.0% reported by Rizvi and Luby (2004) among Nepalese women; the 77.0% reported by Oyewole et al. (2010) among HIV-infected women in Sagamu, Ogun state, Nigeria; the 70.0% reported by Nwankwo et al. (2010) among females of reproductive age in Kano, Nigeria; and the 65.4% reported by Donbraye-Emmanuel et al. (2010) in their study. This 24.4% disagrees with the reports of Nwadioha et al. (2010) from Jos. Nikolov et al. (2006) reported 88.3% prevalence by microscopy while Klufio et al., (1995) reported 57.0% infection microbiologically. It is lower than 42.0% reported by Nwadioha et al. (2010) among women at Aminu Kano Teaching Hospital, Kano, Nigeria. It is also lower than the 29.7% reported by Di Bartolomeo et al. (2002) among among adolescents group and the 37.8% reported by Aboyeji and Nwabuisi (2003) among pregnant women in Ilorin, Nigeria; and the 38.02% reported by Rao et al. (2004) among in a rural setup. According to Di Bartolomeo et al. (2002), *Candida spp* prevalence is important in both adolescents and adult. *C. vaginalis* was the *Candida species* more frequent among Surinamese women (Engberts et al., 2006; Alli et al., 2011).

Klufio et al. (1995) reported that infections by *C. albicans* had no association with any of the sociodemographic characteristics studied. High prevalent of *C. albicans* was recorded among age group 16-30 years (28.2%). This high prevalent rate of *C. albicans* observed in this age group is an indication that *C. albicans* is becoming a leading etiology of the reproductive tract infections in women of child bearing age. The highest prevalence of candidiasis was found amongst women in age group 16-30 years could be due to the higher oestrogen content of the vaginal epithelia (Sobel, 1997). Also, the age range of between 16-30 years constitute the sexually active period of most women. The ages of the subjects used in this study ranged from 16 to 50 years. This conforms to the findings of previous studies (Konje et al., 1991). Konje et al. (1991) showed that the infections were almost uniformly distributed in all age groups studied. According to Adad et al. (2001), infection by *C. albicans* were most frequent among younger patients, especially those ages under 20 years, in all decades. Engberts et al. (2006) reported the prevalence of *C. albicans* to be significantly higher in the cohort of 30-year-old Dutch women and lower in the cohorts of 45-, 50-, 55-and 60-year-old Dutch women. Murta et al. (2005) reported that the frequency of *Candida sp.* is a less common feature among ages between 40 years and 49 years and that the frequency of finding of *Candida sp.* in women above 60 years old may be influenced by hysterectomy.

High prevalence of *C. albicans* in pregnant women 39(31.2%) compared to non-pregnant women 22(17.6%) could be due to increased oestrogen content, glycosuria in the acidity of the vagina due to rich glycogen content of the vaginal mucosa thereby providing an ample supply of utilizable sugar that favor the growth of *C. albicans* during pregnancy. This high incidence of candidiasis among women, and especially pregnant ones, supports the studies of (Eschenbach et al. 1999; Ohm and Salask 1995; Hammill, 2000).

Candidiasis is often diagnosed on the basis of clinical features alone and as many as half of these women may have other conditions e.g. allergic reactions (Patel *et al.,* 2003; Akah et al., 2010). Of the 61(24.4%) patients with *C. albicans*, 36(26.7%) were symptomatic while 25(21.7%) were asymptomatic. It must be recognized that the unnoticed asymptomatic infection caused by *C. albicans* could likely lead to other severe complications. Therefore, the diagnosis of asymptomatic infection especially in pregnant women is of great importance. Konje et al. (1991) reported in their study that about half of their patients were referred from other clinics with vaginal discharge and various other symptoms and signs. Vaginal discharge is very common problem among females. Alteration in balance of normal vaginal organisms can cause the overgrowth of the bacteria that creates vaginal discharge. It is common among sexually active women yet there still remain gaps in our knowledge of this infectious disorder (Shazia et al., 2009; Alli et al., 2011). The 26.7% reported for clinical presentation of candidiasis in this study is higher than the 15.2% reported by Konje et al. (1991) who detected candidiasis in 15.2% of women who had a vaginal infection. It is also higher than the 13.27% reported for candidiasis by Fernández-Limia et al. (2007). The prevalence of symptomatic candidiasis is high in our study (26.7%). According to Konje et al. (1991), this could be due to the economic necessity of husbands leaving wives to find work and who consequently have several sexual partners. It may also be a result of increased contraceptive use among older women which fosters multiple sexual relationships. The prevalence which could be misdiagnosed as vulvovaginal candidiasis on clinical presentation alone is high and could be wrongly subjected to treatment. This highlights the need for laboratory diagnosis before commencing therapy (Akah et al., 2010).

Candida albicans had been isolated from several clinical specimens from different part of Nigeria (Donbraye-Emmanuel et al., 2010; Alli et al.,

2011) and different parts of the world (Adad et al., 2001; Choudhry et al., 2010; Hedayati and Shafiei, 2010; Alli et al., 2011). Mendes et al. (2009) documented that *Candida species* typically forms multiple microabscesses and small macroabscesses scattered throughout the brain. McGee et al. (2009) also documented *Candida species* among immunocompromised patients with vaginitis and secondary to hematogenous spread. Candida has also been implicated as the cause of Fournier's gangrene in an immunocompromised patient in a study by Loulergue et al. (2008). Baradkar et al. (2008) documented other *Candida species* among patients with bronchopneumonia originating from endobronchial inoculation or more commonly a hematogenously seeded, nodular diffuse infiltrate. Yildirim et al. (2008) reported Candida in a patient without any history of underlying malignancy. Other species of *Candida* has been identified in a patient with meningitis in Australia (van Hal et al., 2008; Alli et al., 2011) and in an immunocompromised patient with multifocal osteomyelitis in Germany (Wellinghausen et al., 2009; Alli et al., 2011).

5. Conclusion

A relatively high prevalence of *Candida albican* was documented in this study. Although the prevalence of *C. albicans* was high, it was similar to that found in other parts of Nigeria. These findings should be taken into account in further studies concerning presence of *C. albicans* among women in Nigeria. *C. albicans* is one of the organisms responsible for female genital discharge and it cut across all the clinical cases investigated during this study. More studies should be encouraged in this direction to reduce the incidence of female genital discharge. It is advised that all females should go for regular routine check- up. There should also be regular public enlightenment for young women on the importance of personal hygiene, the use of condom for safe sexual activities, appropriate use of contraceptive pills and proper choice of cloths to avoid wearing tight fitting underpants that allow the overgrowth of pathogenic organisms like *C. albicans*.

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