Detection and prevalence of Candida isolates among patients in Ibadan, Southwestern Nigeria

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ABSTRACT

Objective: This study aimed to detect and determine the prevalence of Candida isolates among patients attending special treatment clinic at UCH in Ibadan, Nigeria. Methods and results: A total of one hundred patients (47 males and 53 females) of different ages and socioeconomic status attending special treatment clinic at University College Hospital, Ibadan, were enrolled in this study. Samples of high vaginal swab (HVS) were collected per participant and processed using standard bacteriological methods. A total of 22 Candida isolates were obtained in this study, of which 12 (60.0%) were predominantly Candida albican and 10(40.0%) was Candida species. The isolates were obtained from majority (20.0%) of the subjects who presented with vaginitis/vaginal discharges, 18.0% presented with urethral itching/urethral discharges, 7.0% had clinical symptoms of candidiasis, 5.0% gonococcal urethritis, 3.0% had haematuria and infertility, 2.0% had PID and 1.0% had dysuria while 22.0% did not state their clinical presentations and 19.0% came for check ups. Conclusion and application of findings: Extremely high prevalence of Candida albican and Candida species were documented in this study. Although the prevalence of these organisms was high, it was similar to that found in other parts of Nigeria. These findings should be taken into account in further research concerning presence of Candida isolates among patients with sexually transmitted diseases in Nigeria.

Key words: Candida albican, Candida species, pathogens colonization, HVS, STDs, Nigeria

INTRODUCTION

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). It is also known as candidosis or moniliasis. VVC can be recurrent or relapsing (Ferris *et al.*, 2002; 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. glabrata* and *C. tropicalis*. *Candida* spp. that rarely cause infection includes *C. parapsilosis*, *C. pseudotropicalis*, *C. krusei*, *C. guilliermondii* and *C. stellatoidea* (Cronje *et al.*, 1994).

*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). Carrier rates are higher in women treated with broad spectrum antibiotics (Singh, 2003), pregnant women, diabetic women (Donders, 2002; de Leon *et al.*, 2002) and women with HIV/AIDS (Reed *et al.*, 2003; Duerr *et al.*, 2003; Akah *et al.*, 2010). *Candida albicans* is both the most frequent colonizer and responsible for most cases of VVC (Singh, 2003). Nevertheless, over the last decades there have been reports demonstrating an increment in the frequency of cases caused by non-albicans species with *Candida glabrata* consistently being the leading species (Ray *et al.*, 2007; Akah *et al.*, 2010). The only well proven predisposing factors are pregnancy, diabetes mellitus (CDC, 2002), and the use of broad spectrum antibiotics (Mardh *et al.*, 2002) as well as oral contraceptive with high oestogen content (Akah *et al.*, 2010). 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) and diet with high glucose content (de Leon *et al.*, 2002; Akah *et al.*, 2010). 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 (McMclelland *et al.*, 2009) and infected partners commonly carry identical strains which orogenital transmission has been documented (Akah *et al.*, 2010).

*Candida albicans* and other *Candida species* had been isolated from several clinical specimens from different part of Nigeria (Donbraye-Emmanuel *et al.*, 2010) and different parts of the world (Adad *et al.*, 2001; Choudhry *et al.*, 2010; Hedayati and Shafiei, 2010). A marked decline in bacterial sexually transmitted infections (STIs), resulting in an apparent increase in other microbial STIs has been observed in previous studies by several authors. This has been reported from different regions of India (Kumar *et al.*, 2002; Narayanan, 2005; Ray *et al.*, 2006). 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. Candida has also been implicated as the cause of Fournier's gangrene in an immunocompromised patient in a study by Loulergue *et al.* (2008). 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) and in an immunocompromised patient with multifocal osteomyelitis in Germany (Wellinghausen *et al.*, 2009). 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.

The differences could be due to geographic, ethnic, and socioeconomic factors, as well as differences in sampling and culturing techniques. Variations may also reflect differences in sexual practice and environmental factors such as hygiene and nutrition (Hansen *et al.*, 2004; Busetti *et al.*, 2007; Donbraye-Emmanuel *et al.*, 2010). The diagnostic standard is the culture
of anal and genital. In order to detect pathogens in urethral or vaginal specimens, efficient standard culture and a rapid screening method is required to identify carriage of pathogens in men and women (Donbraye-Emmanuel et al., 2010). To determine whether routine testing/screening for STI pathogens is necessary in our setting, there is need to determine the urethral and vaginal carriage rate of \textit{Candida} amongst Nigerian men and women. The aim of this study therefore was to determine urethral and vaginal carriage rate of \textit{Candida} among patients in Ibadan, Southwestern, Nigeria.

\textbf{MATERIALS AND METHODS}

\textbf{Study area}

The study was carried out in the municipal area of Ibadan, which is made up of five local government areas. Ibadan city lies 3°5' E and 7°23' N. The city is characterized by low level of environmental sanitation, poor housing, and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low income populations.

\textbf{Study population}

A total of one hundred patients (47 males and 53 females) of different ages and socioeconomic status attending special treatment clinic at University College Hospital, Ibadan, were enrolled in this study. The study was conducted over a period of six months starting from February to August, 2000 by recruiting consecutive consenting patients presenting at STC, UCH, Ibadan, Oyo State, Southwestern Nigeria until a total of 100 participants was attained. Other relevant information of all participants was obtained using a proforma specially designed for this purpose. The study was approved by the ethical review committee of the hospital.

\textbf{Specimen collection}

Samples of urethral swabs (from males), endocervical and high vaginal swabs (from females) of secretions were collected for bacteriological examination under aseptic condition using a speculum with the help of a gynaecologist. The specimens were transported in a commercially available collection and BBL Culture Swab Plus (Becton Dickinson, Heidelberg, Germany) to medical microbiology and parasitology laboratory, UCH, Ibadan for analysis.

\textbf{Wet preparation, culture isolation and identification:}

The Urethral swabs and High vaginal swabs collected were inoculated onto Sabouraud dextrose agar (SDA) [Biotec, Ipswich, UK] and incubated aerobically at 37°C for 48rs. Candida species were checked for on the chocolate agar plates. Germ tube test were performed on yeast isolates to confirm \textit{Candida albican}. Yeast isolates were screened for germ tube production in serum broth. \textit{Candida albicans} were identified on the basis of the following features: thick-walled oval yeast cells with pseudomycelium and germ tube formation in human serum at 37°C. Germ tube negative species were regarded simply as yeast species (Cheesbrough, 2006). The results were analyzed using the $\chi^2$-test, with the level of significance set at $p < 0.05$.

\textbf{RESULTS}

A total of 100 patients presented different types of STDs at the Special Treatment Centre (STC) of the University College Hospital, Ibadan, Southwestern Nigeria. A total of 100
patients presented different types of STDs at the Special Treatment Centre (STC) of the University College Hospital, Ibadan, Southwestern Nigeria. Table 1 shows demographical profile of the subjects and their clinical presentations. The age of subjects ranged from <20 to >30 years, 35.0% of them was in the age group of 21-30 years, and 31.0% of them did not disclose their age. Fifty-three percent (53.0%) of the subjects were female, while 43.0% were males, and the female-to-male ratio was 2:1. Forty-eight percent of the subjects (48.0%) were married at the time of presentation while 30.0% were single. Seventy-five percent (75.0%) of the subjects had one sexual partner while 14.0% had multiple sexual partners. Twenty-nine percent (29.0%) of the male subjects had one sexual partner and 10.0% had multiple sexual partners. In contrast, most of the female subjects (46.0%) had one sexual partner. The intervals from the last sexual intercourse to the onsets of symptoms that brought the subjects to the clinic varied from 1 to 35 days with the mean at 18 days. From the Table 1, it can be deduced that majority (20.0%) of the subjects presented with vaginitis/vaginal discharges, 18.0% presented with urethral itching/urethral discharges, 7.0% had candidiasis, 5.0% gonococcal urethritis, 3.0% had haematuria and infertility, 2.0% had PID and 1.0% had dysuria while 22.0% did not state their clinical presentations and 19.0% came for check ups.

Table 1: Demographic profiles and clinical presentations of the patients at the Special Treatment Clinic, in Ibadan, Southwestern Nigeria

<table>
<thead>
<tr>
<th>Demographic profiles</th>
<th>No. Tested (%)</th>
<th>No. males (%)</th>
<th>No. females (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Group (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20</td>
<td>10(10.0)</td>
<td>01(10.0)</td>
<td>09(90.0)</td>
</tr>
<tr>
<td>21-30</td>
<td>35(35.0)</td>
<td>18(51.4)</td>
<td>17(48.6)</td>
</tr>
<tr>
<td>31 and above</td>
<td>24(24.0)</td>
<td>12(50.0)</td>
<td>12(50.0)</td>
</tr>
<tr>
<td>Not stated</td>
<td>31(31.0)</td>
<td>14(45.2)</td>
<td>17(54.8)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>48(48.0)</td>
<td>17(35.4)</td>
<td>31(65.6)</td>
</tr>
<tr>
<td>Single</td>
<td>30(30.0)</td>
<td>18(60.0)</td>
<td>12(40.0)</td>
</tr>
<tr>
<td>Undisclosed</td>
<td>22(22.0)</td>
<td>12(54.5)</td>
<td>10(45.5)</td>
</tr>
<tr>
<td><strong>Sexual relationship</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sexual partner</td>
<td>01(1.0)</td>
<td>00(0.0)</td>
<td>01(100.0)</td>
</tr>
<tr>
<td>One sexual partner</td>
<td>75(75.0)</td>
<td>29(38.7)</td>
<td>46(61.3)</td>
</tr>
<tr>
<td>Multiple sexual partner</td>
<td>14(14.0)</td>
<td>10(71.4)</td>
<td>04(28.6)</td>
</tr>
<tr>
<td>Undisclosed</td>
<td>10(10.0)</td>
<td>08(80.0)</td>
<td>02(20.0)</td>
</tr>
<tr>
<td><strong>Clinical presentations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginitis/vaginal discharge</td>
<td>20(20.0)</td>
<td>00(0.0)</td>
<td>20(100.0)</td>
</tr>
<tr>
<td>Urethral itching/discharge</td>
<td>18(18.0)</td>
<td>18(100.0)</td>
<td>00(0.0)</td>
</tr>
<tr>
<td>Candidiasis</td>
<td>07(7.0)</td>
<td>00(0.0)</td>
<td>07(100.0)</td>
</tr>
<tr>
<td>Gonococcal urethritis</td>
<td>05(5.0)</td>
<td>05(100.0)</td>
<td>00(0.0)</td>
</tr>
<tr>
<td>Haematuria</td>
<td>03(3.0)</td>
<td>00(0.0)</td>
<td>03(100.0)</td>
</tr>
<tr>
<td>Infertility</td>
<td>03(3.0)</td>
<td>03(100.0)</td>
<td>00(0.0)</td>
</tr>
<tr>
<td>P.I.D.</td>
<td>02(2.0)</td>
<td>00(0.0)</td>
<td>02(100.0)</td>
</tr>
<tr>
<td>Dysuria</td>
<td>01(1.0)</td>
<td>00(0.0)</td>
<td>01(100.0)</td>
</tr>
<tr>
<td>Check ups</td>
<td>19(19.0)</td>
<td>10(52.6)</td>
<td>09(47.4)</td>
</tr>
<tr>
<td>Not stated</td>
<td>22(22.0)</td>
<td>11(50.0)</td>
<td>11(50.0)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100(100.0)</td>
<td>47(47.0)</td>
<td>53(53.0)</td>
</tr>
</tbody>
</table>

Table 2 shows the frequency of occurrence of Candida isolates recovered from patients at the Special Treatment Clinic in Ibadan, Southwestern Nigeria. A total of 22 Candida isolates
were obtained in this study (Table 2), of which 12 (60.0%) were predominantly \textit{Candida albicans} and 10 (40.0%) was \textit{Candida species}.

Table 2: Frequency of occurrence of Candida isolates obtained from patients at the Special Treatment Clinic in Ibadan, Southwestern Nigeria

<table>
<thead>
<tr>
<th>Isolates</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Candida albicans}</td>
<td>12 (60.0)</td>
</tr>
<tr>
<td>\textit{Candida species}</td>
<td>10 (20.0)</td>
</tr>
<tr>
<td>\textbf{Total}</td>
<td>22 (100.0)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

In this study, 20.0% of the subjects presented with vaginitis/vaginal discharges, 18.0% presented with urethral itching/urethral discharges and 7.0% had candidiasis. This conforms to the findings of previous studies in Nigeria and outside Nigeria (Ogunbanjo, 1989; Konje et al., 1991; Fernández-Limia et al., 2007). Vulvovaginal candidiasis (VVC) is a common condition, and an estimated 75% of all women experience an infection with \textit{candida} yeast during their lifetime (Akah et al., 2010). Tropical venereal diseases still cause genital ulcers in Nigeria (Ogunbanjo, 1989). Dermatophyte infection, genital warts, and pediculosis pubis also occur, but scant data exist (Ogunbanjo, 1989). Most women at STD clinics have vaginitis and vaginal discharge (Ogunbanjo, 1989). 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. The 20.0% reported for clinical presentation of vaginitis/vaginal discharge in this study is lower than the 43.13% reported by Konje et al. (1991) in their study. 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).

The 7.0% reported for clinical presentation of candidiasis in this study is lower than the 15.2% reported by Konje et al. (1991) who detected candidiasis in 15.2% of women who had a vaginal infection; the 13.27% reported for candidiasis by Fernández-Limia et al. (2007). Even though the prevalence of candidiasis is rather low in our study (7.0%), bacterial vaginosis is the leading cause of vaginitis and vaginal discharge in Nigeria (Ogunbanjo, 1989). 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. 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). The rate 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).

The ages of the subjects used in this study ranged from <20 to >30 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. In this study, 53.0% of the subjects were females, while 43.0% were males, and the female-to-male ratio was 2:1. Klufio et al. (1995) reported that infections by \textit{C. albicans} had no association with any of the sociodemographic characteristics studied. According to Adad et al. (2001), infection by
Candida sp. were most frequent among younger patients, especially those ages under 20 years, in all decades. Engberts et al. (2006) reported the prevalence of Candida 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.

Also in this study, 48.0% were married at the time of presentation while 30.0% were single; 75.0% had one sexual partner while 14.0% had multiple sexual partners. In line with previous studies by some other researchers, it showed that increasing promiscuity either as a result of increased mobility of husbands (due to economic depression) or increased use of contraception by older women was thought to be responsible for the persistence of infections by Candida albicans and other Candida species (Konje et al., 1991). The observed associations of a higher prevalence rate of Candida isolates with certain socio-demographic characteristics such as sex, age, marital status, and sexual relationship lend credence to the fact that sexual transmission may be an important risk factor in vulvovaginal candidiasis due to Candida albicans (Nwankwo et al., 2010).

In the present study, Candida albicans (60.0%) was the commonest infection and Candida sp. (40.0%) was least. Although, 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). These percentages reported for Candida albicans (60.0%) and Candida sp. (40.0%) 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 26.0% reported for candida colonization and/or infection among pregnant women by Donbraye-Emmanuel et al. (2010).

The overall carrier rates observed for C. albicans among other Candida isolates was 60.0%. This agrees favourably with the finding published by Sobel et al. (1998) who reported a prevalence rate of 60.0% in their study. This is comparatively higher than the 40.0% reported by Oyewole et al. (2010) among non HIV-infected women in Sagamu, Ogun state, Nigeria; the 29.7% reported by Hedayati and Shafiei (2010) in their study; the 33.6% reported by Adeoye and Akande (2007) among women at LUTH and Military Hospital, Lagos; the 22.0% reported by Konje et al. (1991) in Ibadan; the 23.0% reported by Klufio et al. (1995) among pregnant women presenting to Port Moresby General Hospital, Papua New Guinea in 1990-91; the 22.1% reported by Anorlu et al. (2004) among women in Lagos University Teaching Hospital, Lagos, Nigeria; and the 21.5% and 21.3% reported by Usanga et al. (2010) among pregnant women and non-pregnant women in Calabar, Nigeria. This was also higher than the findings published by some other workers (Nwokedi and Aniyam, 2003; Khan et al., 2009; Muvunyi and Hernandez, 2009) who reported a prevalence rate of 12, 28, and 52.5% respectively. However, 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 agrees 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 % infection microbiologically. The high rates 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).
study, the prevalence of vaginal candidiasis in pregnant women was only 28% with *Candida albicans* being implicated in more than 90% of the cases (Garcia et al., 2004).

The overall carrier rates observed for *Candida species* was 40.0%. This is comparatively lower than 42.0% reported by Nwadioha et al. (2010) among women at Aminu Kano Teaching Hospital, Kano, Nigeria and 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 and 29.7% among adolescents group in their study; the 23.9% reported by Murta et al. (2000) among women without human papilloma virus (HPV) infection; the 37.8% reported by Aboyeye 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).

In conclusion, extremely high prevalence of *Candida albicans* and *Candida species* were documented. Although the prevalence of these organisms was high, it was similar to that found in other parts of Nigeria. This could be attributed to a lot of factors. 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). A study among African women wearing tight clothes reported a higher prevalence of *Candida albicans* in Vulvovaginal candidiasis than those wearing loose clothing (Elegbe and Botu, 1982). 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*. However, the findings of this study indicated that the presence of *Candida albicans* and *Candida species* among these subjects was high and could be associated with an increased risk for sexually transmitted diseases in Nigeria. These findings should be taken into account in further research concerning presence of Candida isolates among patients with sexually transmitted diseases in Nigeria.

**REFERENCES**


