

Prevalence of *Candida* Species among Unmarried Women Attending Lafia Primary Healthcare Centers

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Abstract

One of the several normal-flora of an individual's vaginal, oral cavity, gastrointestinal tract and mucosal membrane are *Candida* species. *Candida* have been associated with diverse diseases including life threatening invasive, superficial and hematogenic infections. This study determined the prevalence of *Candida* species amongst unmarried women attending Lafia Primary Healthcare Centers. Forty high vagina swabs were collected from unmarried women. Isolation and identification of *Candida* species were performed according to standard procedures using Sabouraud Dextrose Agar, Gram staining and Germ tube test. 13 (32.5%) were positive for five different *Candida* species. *Candida albicans* was the most prevalent (38.46%; 5/13) species while non-albicans *Candida* [*C. glabrata* (23.07%; 3/13), *C. tropicalis* (6.89%; 2/13), *C. parapsilosis* (3.44%; 1/13) and *C. krusei* (6.89%; 2/13)] accounted for 61.54% (8/13) of the total positive cases. Women aged 15-18 years and 23-26 years had the lowest and highest prevalence rates of 14.28% (1/7) and 42.10% (8/19) respectively. Candidiasis is a threat to global health and should be taken with all seriousness. The high candidiasis prevalence observed herein portrays a concern and calls for a continuous study of unmarried women attending Primary Healthcare Centers in Lafia. Furthermore, there should be improvement in creating awareness of the opportunistic pathogenic characteristic of *Candida* species as normal flora and the effect they cause when there's hormonal imbalances caused by drug abuse, pregnancy, and poor dieting. The practice of good hygiene should be observed in order to prevent the spread of the infection.

Keywords: Age, *Candida*, candidiasis, fungal infection, vulvovaginal, prevalence

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Introduction

Since the 1980s, there has been an increase in the incidence and prevalence of invasive fungal infections especially in the large population of immunocompromised individuals alongside those who have been hospitalized with serious underlying diseases [1,2]. *Candida* species belong to the normal flora of an individual's mucosal oral cavity, gastrointestinal tract, vagina and they are also responsible for diverse diseases including life threatening invasive, superficial and hematogenic infections [3]. Women that are diabetic, pregnant, under treatments with broad spectrum antibiotics or living with HIV have been reported to have higher carrier rates [4-7]. Though yeast infection occurs in men usually at the penis, it is very rare. Vagina candidiasis (vulvovaginitis or yeast infection) is the most common type of infection caused by *Candida* species with *C. albicans* being the major cause of the infection [8]. Preliminary research has revealed that candidiasis (vaginal infection) occurs due to the poor dietary habits, prolonged use of broad-spectrum antibiotics, use of tight underwear causing discomfort among women, and poor personal hygiene. Despite the foregoing, there has been little or no documented information on the epidemiology and species prevalence of *Candida* among unmarried women attending Lafia primary healthcare centers (PHCs). This study therefore aimed to assess and determine the prevalence of *Candida* species

amongst unmarried women attending Lafia Primary Healthcare Centers.

Materials and Methods

Study area

The study was carried out at the Department of Microbiology Laboratory, Federal University of Lafia located in Lafia, Nasarawa State's capital. Lafia is a large town which covers latitude 8°25'40" N to 8°34'15" N and longitude 8°24'25" E to 8°38'19" E in Northern Nigeria with a population of 330, 712 [9, 10].

Inclusion and exclusion criteria

Unmarried women with ages ranging from 15 to 30 years, with or without exhibiting clinical manifestations of vaginal discomfort were included in this study. Women below 15 years and above 30 years, pregnant and menstruating were excluded.

Consent and ethical clearance

Volunteers were briefed (and interpretation provided were necessary) about the research, its purpose and the confidentiality of data guaranteed. Informed and signed consents of participants were obtained prior to collection of samples from volunteers.

Ethical clearance was sought and approval received from the review and ethics committees of Ministry of Health and Federal University of Lafia.



Samples collection

Forty High vagina swabs were obtained, as described by Chuku *et al.* [11], from unmarried women between the ages of 15-30 years. Aseptically, high vaginal swabs were collected from participants by inserting and gently rotating sterile swab sticks in the posterior vaginal fornix. The swab sticks were gently removed and replaced in their cases which were code-labelled, and transported in sterile containers to the laboratory for processing and cultivation.

Isolation and identification of *Candida*

The vaginal swab was initially inoculated on Sabouraud Dextrose Agar (SDA). First, an inoculum pool was made with the swab specimen then a sterile wire loop was used to spread the inoculum by streaking in quadrant to obtain discrete colonies. Incubation was at 37°C for 48 h under anaerobic conditions [12]. Colonies which appeared white to cream in color with a smooth border and a pasty and moist consistency were subcultured and preserved in SDA slants.

Presumptive *Candida* isolates were examined and identified morphologically and microscopically by lactophenol cotton blue [11], Gram staining [13] and Germ tube test [14] for hyphae and germ tube.

Results and Discussion

Vulvovaginal candidiasis distribution and prevalence with regards to age is as shown in Table 1. A total prevalence of 32.50% (13/40) was observed. Unmarried women within 15-18 years and 23-36 years of age had the lowest and highest candidiasis prevalent rate of 14.28% (1/7) and 42.10% (8/19), respectively.

Table 1: Prevalence of *Candida* species in relation to age of the subjects

Age difference	Number of patients	Positive (%)	Negative (%)
15-18	7	1 (14.28 %)	6 (22.22 %)
19-22	10	3 (30.00 %)	7 (25.92 %)
23-26	19	8 (42.10 %)	11 (40.74 %)
27-30	4	1 (25.00 %)	3 (11.11%)
Total	40	13 (32.50%)	27 (67.50%)

Table 2: Species distribution of *Candida* isolates from the 13 positive *Vulvovaginal candidiasis* case

Species	Occurrence (%)
<i>C. albicans</i>	5 (38.46%)
<i>C. krusei</i>	2 (15.38%)
<i>C. glabrata</i>	3 (23.07%)
<i>C. parapsilosis</i>	1 (7.69%)
<i>C. tropicalis</i>	2 (15.38%)
Total	13 (100)

Five species of *Candida* were identified from the 13 cases with *Vulvovaginal candidiasis*, including *C. albicans* and 4 non-*albicans Candida*. The most frequent species was *C. albicans* (38.46%; 5/13),

followed by *C. glabrata* (23.07%; 3/13), *C. tropicalis* and *C. krusei* (6.89%; 2/13 each) and *C. parapsilosis* had the least occurrence rate of 3.44% (1/13) as presented in Table 2.

Every year, millions of women are affected with *Vulvovaginal candidiasis*, which is still treated as a minor illness in most poor nations like Nigeria. This study found a prevalence rate of 32.50% (13/40) of *Vulvovaginal candidiasis*, which is lower than the 52.5% [15], 53.0% [11], and 90.38% [14] among HIV-positive women in Sagamu, Ogun state, Nigeria. However, it contradicts reports of [16–18] where higher prevalence rates of 14, 30, and 17% were reported among non-pregnant women in Abuja, Oyo, and Enugu states, respectively. The disparity in prevalence rates observed could be attributed to variations in the demographic and geographic region examined.

In terms of age, women between the ages of 23 and 26 had the greatest frequency of candidiasis infection, accounting for 42.10%. According to [11, 19, 20], this may be associated with increases in sexual activities, hormonal effects, prevalent dietary kinds, poor personal cleanliness, the use of contraceptives, and drug addiction within this age bracket. This study further adds to the diversity of prevalence rates earlier reported, agreeing with reports of [16, 21–23] and contradicting those of [24, 25]. Participants aged 15-18 years had the lowest *Vulvovaginal candidiasis* prevalence rate of (14.28%), with Goncalves *et al.* [19] suggesting that strong vaginal immunity, and the onset of the production of sexual and reproductive hormone in adolescents could be responsible for this low prevalence rate. No age group, however, was completely devoid of vaginal candidiasis.

This study further revealed that *C. albicans* was the *Candida* species that occurred the most with a prevalence rate of 38.46%, which agrees with earlier studies of [11, 26–29]. Hyphae formation ability of *C. albicans* in the vagina murine region, NLRP3 inflammasome activation and expression of candidalysin by *C. albicans* aids ability to evade immune response and survive in the vaginal region [30]. Non-*albicans Candida* accounted for 61.54% (8/13) of positive cases observed in this study, agreeing with similar studies conducted in Egypt [31] and India [32] where they accounted for over 60% prevalence rates in those studies. Amongst non-*albicans Candida* species, *C. glabrata* and *C. parapsilosis* were the most and least prevalent with occurrence rates of 23.07% (3/13) and 7.69% (1/13) respectively, agreeing with earlier findings of [11, 33–35]; which reported dominance of *C. glabrata* among non-*albicans Candida* species. As reported by [32, 36, 37], single- and low-dose antifungal treatment and azole-maintenance regimens, and the proliferation and increased usage of over-the-counter antifungal drugs are responsible for the increased prevalence of non-*albicans Candida* incidence and infections.

Conclusion

Women's health – and general public health (through transmission via sex and childbirth) – in the society is been threatened by vaginal candidiasis and hence should be taken with all seriousness. The high candidiasis prevalence observed herein portrays a concern and calls for a continuous study of unmarried women (and men by extension) attending Primary Healthcare Centers in Lafia, Nasarawa State and the country at large. Furthermore, there should be improvement in creating awareness of the opportunistic pathogenic characteristic of *Candida* species as normal flora and the effect they cause when there's hormonal imbalances caused by drug abuse, pregnancy, and poor dieting. The practice of good hygiene should be observed in order to prevent the spread of the infection.

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