Prevalence of Candidiasis Among Pregnant and Non-Pregnant Women in Eleme And Okrika Local Government Areas of Rivers State

Abstract

Candidiasis is a common opportunistic fungal infection caused by yeast, which affects mainly women. *Candida* generally regarded as secondary invader of immunocompromise patients organs due to some previous medical conditions such as pregnancy, HIV and other similar conditions but *Candida* can be of primary origin with the introduction of the fungus into the body through the mucocutaneous surfaces. The prevalence of candidiasis among pregnant and non-pregnant women in two Local Government Areas of Rivers State, Nigeria was investigated. A total of 95 women from ages of 18 to 46 years were selected for the study, which was conducted from September, 2021 to March, 2022. The aim of this study was to determine the prevalence of vaginal candidiasis among pregnant and non- pregnant women in two Local Government areas of Rivers State. The study population included pregnant and non-pregnant women. Vaginal specimens were collected and cultured on Sabouraud Dextrose Agar (SDA) and also sub cultured on Hi Crome *Candida* differential Agar; for identification of *Candida* species by colour, Shape and appearance. The isolates obtained were subjected to gram staining and germ tube test. Quantitative methods that required measurement of some diameter was used to produce estimates of the susceptibility of the *Candida* species to some anti-fungal drugs namely; Nystatin and fluconazole. Identified *Candida* species using cultured technique include *Candida albicans, Candida glabrata, Candida tropicalis* and *Candida parapsilopsis.* Results further revealed a higher prevalence rate of candidiasis in pregnant women 29.4% compared to non-pregnant women 13.68%. Results of distribution of candidiasis according to trimester of pregnancy showed that *Candida albicans* and *Candida glabrata* were more prevalent in pregnant women while the distribution for non-pregnant women showed that *Candida albicans* were the most implicated species that causes vaginal candidiasis. Twenty-six *Candida albicans* species were subjected to germ tube test and ten isolates were confirmed positive to germ tube formation. *Candida* species identified using the PCR techniques were *Candida albicans* and *Candida tropicalis*. This study showed lower rate of candidiasis in women due to high rate of personal hygiene and medical facilities provided and also the study shows a higher prevalence in pregnant women compare to non-pregnant women. The women at great risk were those between the ages of 26 to 35 years and in their third trimester. *Candida albicans* was the most prevalent vaginal *Candida* species across all age groups and trimesters

Introduction

Candidiasis is an opportunistic infection caused by a yeast-like fungus *Candida*. The most common yeast that causes this infection is *Candida albicans*. Candidiasis occur when the normal number of fungi that reside in the vagina increases enough to cause symptoms.The clinical manifestations of vagina candidiasis is white vaginal discharge, swelling, pruritus, pain, irritation, burning sensation, superficial dyspareunia and dysuria. *Candida albicans* infection occurs in the vast majority of diagnosed cases while infection with other species such as *Candida glabrata* and *Candida tropicalis* occur less frequently (Boselli *et al*., 2004). The female genital provides a

satisfactory environment for many pathogenic microorganisms. This health condition can as well be present occasionally even in healthy women. Vaginal candidiasis may be physiological or pathological.

The prevalent rate of invasive fungal pathogens has increased, especially in the large population of immunocompromised patients like the pregnant women and those hospitalized with serious underlying diseases e.g diabetic patients with HIV/AIDS. The pregnant women are more vulnerable to vaginal infection because of alteration in the body as a result of changes in some conditions like hormonal changes which can increase the level of vaginal candidiasis or reoccurring situation. Approximately 60% of all the pregnant women experience yeast infection and 50% of them suffer recurrent event. This disease condition raises a lot of concern because of the threat to the well-being of the mother and child. Several studies have shown that the prevalence of *Candida* among pregnant women is higher than in non-pregnant women, it tends to increase with the progression of the pregnancy especially from four month to seven months (Ortega *et al*., 2011). In pregnancy, the carrier rate is higher due to altered PH and sugar content in vaginal secretion. Increase in estrogen level during pregnancy produces more glycogen in the vagina and it has direct effect on yeast cell causing it to grow faster and stick more easily with the wall of vagina (Monif *et al*., 2003). This disease condition increases especially in the third trimester. This increase seems to be a trend in pregnant population due to increase level of estrogen and corticoids reducing the defence mechanism against such opportunistic infection (Ortega *et al*., 2011).

Some predisposing factors that increase the risk of contact of moniliasis are pregnancy, prolonged use of broad-spectrum antibiotics, poor personal hygiene, diabetes, use of birth control pills, disorder that weakens the immune system for example, HIV, the eating habit of a pregnant women of sugar rich content food and pregnancy induced hormonal modification that alter the vaginal region to create an enrichment that is more favourable for yeast to grow. However, some health conditions can increase the risk of contracting vaginal candidiasis e.g immunocompromised patient that use pregnancy control pills, intravenous catheters, total parental nutrition, cytotoxic chemotherapy and transplantation. Thus, transmission can occur from mother to child during delivery. Transmission occurs from the vagina of an infected mother to newborn giving rise to congenital *Candida* infection. (Pfaller *et al*., 2007).

Several studies have shown that vaginal candidiasis in pregnant women might be associated with increased risk of complications such as premature rupture of membrane, congenital cutaneous candidiasis, subsequent preterm labour, morbidity in pregnant women population, abortion, emotional stress and suppression of immune system which step up the risk of *Candida* species over growth and become pathogenic (Hedayati and Shefei, 2010). \

The aim of this study was to determine the prevalence of vaginal candidiasis among pregnant and non-pregnant women in two Local Government areas of Rivers State.

Materials and Methods

Study Area

The study was carried out in Eleme and Okrika Local Government Areas in Rivers State. Sampling location are Eleme and Okrika general hospitals

Sample collection

High vaginal swabs were randomly collected using sterile swab sticks to heavily swab inside the vagina and immediately the swab sticks were replaced in their casings and labeled appropriately. A total of ninety-five high vaginal swabs samples were randomly collected from subjects attending Eleme and Okrika General Hospitals. Informed verbal consent was also obtained from them. Care was taken not to contaminate the samples by moving them immediately to the Microbiology Laboratory of Rivers State University, Port Harcourt before two hours for analysis

Media used

Saboraud Dextrose agar (SDA) was used for the cultivation of organism. The agar was prepared according to manufacturer's instruction. Also Hi Crome *Candida* differential Agar was also used; for identification of *Candida* species by colour, shape and appearance.

Cultivation of organism

Samples were cultured on Saboraud Dextrose agar (SDA) containing two percent Chloramphenicol for fungal isolation. Inoculated plates were incubated at 37^0C and examined after 48hrs for cream colored pastry colonies and budding yeast cells suggestive of *Candida* species. Isolates from SDA were sub-cultured on Hi Crome *Candida* differential agar (Hi Media, India) and incubated at 37˚C for 48hrs. Colonies on Hi Crome *Candida* differential agar were identified by colour, appearance and shape. This test was used for presumptive identification of C. *albicans*, *C. tropicalis* and *C. glabrata*.

Biochemical Characterization

These tests were carried out according to CDC (2010) method. *Candida* spp were differentiated from other yeasts and were identified to specie level using Gram stain, microscopy and germ tube formation.

Results

A total number of ninety-five samples were collected for isolation and identification of *Candida* species from both symptomatic and asymptomatic pregnant and non-pregnant women. Out of these, fifty patients were pregnant women while fourty-five were non-pregnant women. The distributions of different Candida species were shown in Fig. 1. The age group showing the highest number of positive candidiasis was of 26 to 35 years age group Fig. 2. In the trimesters of pregnancy the carrier rate was high in the third trimester Table 1.

Fig 1: Percentage of isolated *Candida* species among Pregnant and Non-Pregnant Women

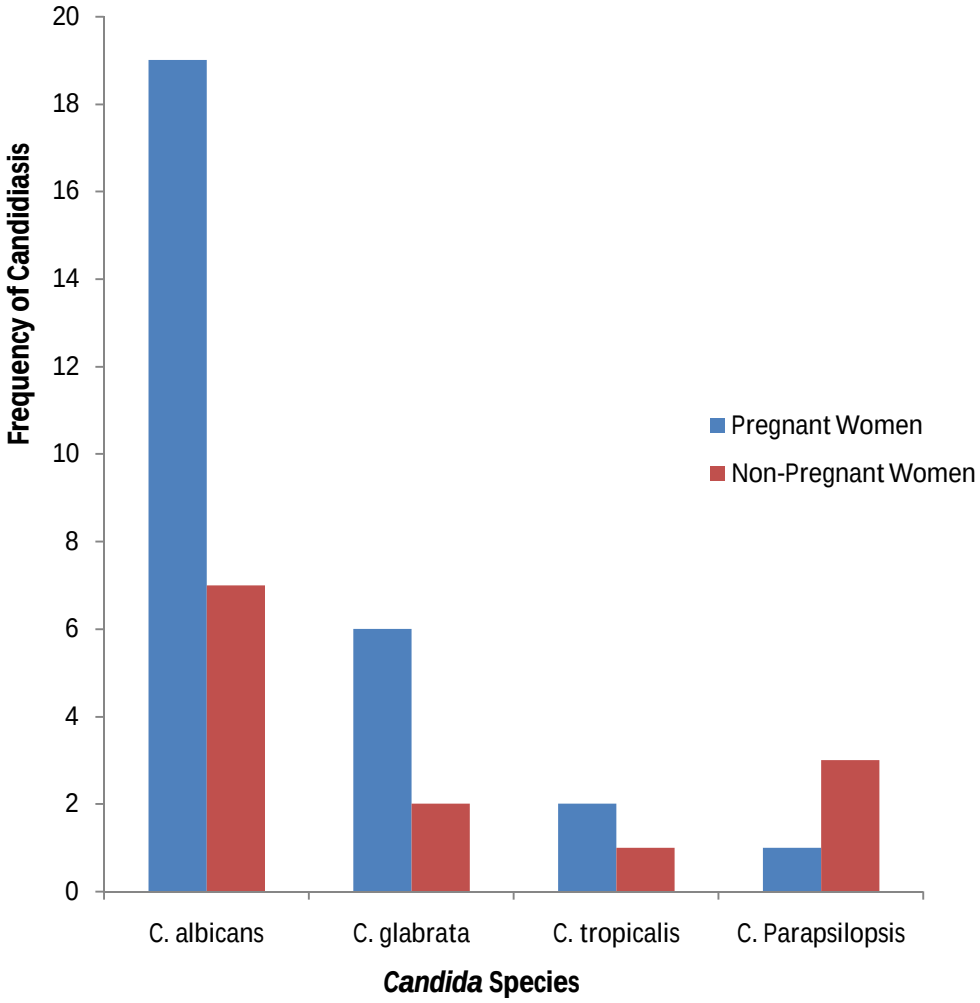

Fig 2: Percentage of isolated *Candida* positive sample among Age Groups of pregnant and non-pregnant subjects.

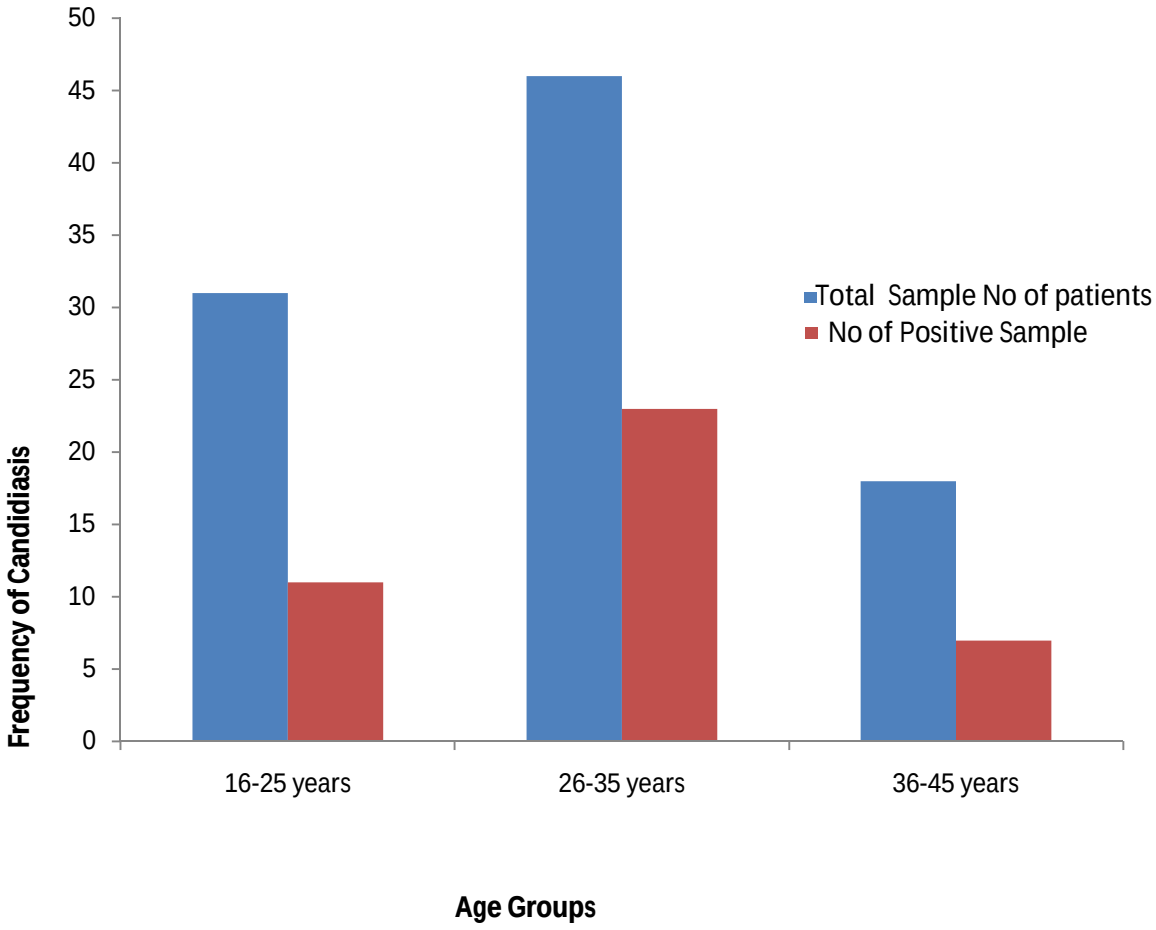

Table 1: Distribution of vaginal *Candida* species according to trimesters of pregnancy

Trimester	Distribution of vaginal *Candida* species				
	C.albicans	***C.glabrata***	***C. tropicalis***	***C. parapsilosis***	**Total**
Ist trimester	2	0	0	0	2
2nd trimester	5	2	0	0	7
3rd trimester	12	4	2	1	19
Total	19	6	2	1	28

DISCUSSION

This study investigated the prevalence of vaginal candidiasis among pregnant and non-pregnant women attending Eleme and Okrika General Hospitals over the period of six months. Three *Candida* species identified during the study were *Candida albicans*, C. glabrata and C. tropicalis. These *Candida* species are pathogens and have been shown to cause infections in non-pregnant women and immunocompromised patients such as pregnant women (Pfaller, 1995). *Candida albicans*, *C. glabrata*, *C. tropicalis*, *C. parapsilosis*, *C. krusei* and *C. guilliermondi* basically constitute the genera of *Candida*. These species have been implicated in candidiasis with low prevalence in previous studies (Boselli *et al.*, 2004). The study of Nelson *et al* (2013) and Majaraz-Rodriguez *et al*., (2012) showed 29.79% prevalence of vaginal candidiasis among pregnant women and 12.6% among non-pregnant women. They are in agreement with this research because the prevalence of vaginal candidiasis among pregnant and non-pregnant women are 29.47% and 13.68%, respectively. The high prevalence of vaginal candidiasis among pregnant women may be due to many different reasons including suppression of the immune system due to the pregnancy, prolonged and misuse of antibiotics which leads to the destruction of good and beneficial bacteria resulting to reduction of vaginal immunity could have also contributed to the increase of the prevalence of the infection.

The highest prevalence of vaginal infections among pregnant and non-women was noted in the age groups 26 to 35 years. This observation in this study is consistent with reports of previous workers. Sehgal *et al*., (1990) which reported a higher incidence rate within age group 26 to 35 years in Benin City. These reports documented that the age group is vulnerable probably due to sexual promiscuity, drug abuse and use of contraceptives. A lower prevalence of the infection in

pregnant women was reported within the age group 36 - 45 years and over 46 years age group with prevalence rates of 12% and 2%, respectively. This finding is in line with a previous report by Okungbowa *et al* (2003) who reported a prevalence rate of 10% and 2% within the age groups of 36 - 45 and over 46 years, respectively. He reported that it was probably due to the possible increase in vaginal immunity with age.

Susceptibility of nystatin to *Candida* species was analyzed as follows: nystatin was sensitive in 17(41.5%) of patients, susceptibility dose dependent in 5(12.2%) of patients and resistant in 19 (46.3%) of patients with vaginal candidiasis.

Susceptibility of fluconazole to *Candida* species was analyzed as follows: fluconazole was sensitive in 10(24.3%) of patients, susceptibility dose dependent in 13(31.7%) of patients and resistant in 18 (43.9 %.) of patients with vaginal candidiasis.

Antifungal susceptibility pattern of *Candida* spp. showed that nystatin has the highest activity against other antifungal agent with a diameter of zone of inhibition of 25mm, 18mm and 12mm against C. albican, C. glabrata, and C. tropicalis respectively. Fluconazole showed activity with diameter of zone of inhibition of 18mm, 15mm and 10mm against. *C. albican*s, *C. glabrata*, and *C. tropicalis* respectively. The percentage susceptibility of *Candida* spp. revealed that of the fourty one isolates subjected to antifungal susceptibility testing, seventeen were sensitive to nystatin and ten were sensitive to fluconazole. This study further revealed that nyastatin had recorded the highest efficacy as a curative agent. Some other study reported that *Candida* species were resistant to fluconazole, ketoconazole and econazole (Lucianc *et al*., 2011; Rehab and Zouhair, 2011). In the study of Ajenjo and Aquevedo *et al*., (2011) 50% of *Candida* species were shown to be resistance to fluconazole. These results, however contradict the report of A-Aali, (2013) who stated that *Candida* species were highly susceptible to fluconazole.

The germ tube profile of the isolates showed revealed that of the twenty-six isolates examined ten shows positive germ tube formation while sixteen shows negative result. A short hyphal (filamentous) extension arising laterally from a yeast cell with no constriction at the point of origin shows positive result while no hyphal extension arising from a yeast cell or a short hyphal (filamentous) extension with constriction at the point of origin shows negative result

Conclusion

Vaginal candidiasis was common in pregnant women in the third trimester and in the bracket 26 to 35 years. It also occur less in non-pregnant women in the age bracket 26-35 years. This study showed lower rate of candidiasis in women due to high rate of personal hygiene and medical facilities provided and also the study shows a higher prevalence in pregnant women compare to non-pregnant women. *Candida albicans* was the most prevalent vaginal *Candida* species across all age groups and trimesters

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