

ORIGINAL ARTICLE

AFRICAN JOURNAL OF CLINICAL AND EXPERIMENTAL MICROBIOLOGY MAY2009
AJCEM/200915/20912
COPYRIGHT 2009
AFR. J. CLN. EXPER. MICROBIOL.10(2): 92-98

ISBN 1595-689X VOL 10(2)
[-http://www.ajol.info/journals/ajcem](http://www.ajol.info/journals/ajcem)

CANDIDA SPECIES AMONGST PREGNANT WOMEN IN BENIN CITY, NIGERIA: EFFECT OF PREDISPOSING FACTORS

¹Oviasogie F.E, and ²Okungbowa F.I. Departments of ¹Microbiology and ²Botany, University of Benin, P.M.B, 1154, Benin City, Nigeria.

*Author for correspondence: Department of Botany, University of Benin, P.M.B, 1154, Benin City, Nigeria.
Email: fiokun2002@yahoo.com Tel: 08055376204.

Abstract

Genital samples from pregnant women were examined to determine the *Candida* species present and how some predisposing factors would affect the frequency of isolation of species. A total of 147 women (87 volunteer asymptomatic pregnant women and 60 asymptomatic non-pregnant women) were examined. High Vaginal Swabs (HVS) were collected in pairs while demographic data (age of individual, age of pregnancy, occupation and use of contraceptive pill) on each subject were obtained alongside. Samples were cultured on Sabouraud Dextrose Agar plates and incubated for 72 hours at 37°C. Results revealed five *Candida* species (*C.albicans*, *C.glabrata*, *C.tropicalis*, *C.stellatoidea*, *C.parapsilosis*) with 61.5, 17.9, 7.7, 5.1, 2.6 % frequency of isolation respectively, as against 73.7, 7.7, 1.4, 11.3, and 0.0% for control. Women in the second trimester of pregnancy had the highest occurrence (68.8%) while the age groups 24-30 and 31-37 years had the highest occurrence in the control (46.2%) and in the pregnant ones (51.7%) respectively. Traders had 68.8%, and full-time housewives, 26.7% occurrence. More women who used contraceptives had *Candida* (58.3%) as against non contraceptive users (35.3%). The results support literature reports that there are high rates of colonization of the vagina of pregnant women by *Candida*. They also give credence to earlier reports that the factors determined here affect the frequency of isolation of *Candida* species from the vagina.

Keywords: *Candida*, pregnancy, women, genital specimens, Benin City.

Introduction

Though members of the normal flora of the skin and mucosal surfaces of humans, several species of *Candida* are capable of causing candidiasis, as infection caused by *Candida* is called (1). Where they occur as normal flora, *Candida* species may gain dominance when there is a disruption of the normal flora balance of the body (as in the immunosuppressed, for example) producing progressive systemic disease (1). Some *Candida* species are also found in the soil and food (2).

The fungus *Candida* lives in small numbers in a healthy vagina, rectum and mouth (3, 4). About 75% of women generally harbour this fungus without it causing harm to them (5,6). Some of the factors which predispose women to vaginal candidiasis are change in pH, use of oral contraceptives, tight clothing, and personal hygiene (4,7). However, it is reported that there is increase in occurrence of vaginal candidiasis during pregnancy due to increased levels of hormones such as

oestrogen and steroid hormones (8). *Candida* infection in pregnancy does not usually harm the unborn child but causes great discomfort to the mother, which includes increased discharge, redness, itching, and burning sensation in the vulva area (9). If the disease is not treated the baby can get infected (oral thrush) at birth which can be a very serious health problem in premature babies. Also, untreated vaginal infections can lead to pelvic inflammatory disease, a condition which can scar the fallopian tube and cause infertility (10). The aim of this study was to determine the *Candida* species present in the vaginas of pregnant women attending two private hospitals in Benin City, and examine the role of age of subject, occupation, age of pregnancy and use of oral contraceptives on the occurrence of *Candida*.

Materials and Methods

Specimens: A total of 87 volunteer pregnant women attending antenatal clinic and 60 non-pregnant women at Suyi Hospital and Lahor Clinic both in Benin City, were screened. High Vaginal Swabs (HVS) were collected in pairs from individuals while demographic information such as age of individual, age of pregnancy, occupation, use of contraceptive pill, were also collected from the women alongside the specimens. For the controls (non pregnant women) absence

of pregnancy was confirmed with the HCG Pregnancy Kit (Quimica Clinica Aplicada, S.A. Amposta,, Spain).

Microscopic examination of specimens

One swab from each pair was used for wet preparation direct mount under the x40 power of an optical microscope to detect the presence of blastospores and pseudohyphae, while the other swab was used to streak Sabouraud Dextrose Agar SDA (Oxoid, England) plates containing 0.5ml Chloramphenicol (500mg, Pfizer) and incubated at 37°C in triplicates. Uninoculated plain agar plates served as control for the inoculated ones. Discrete yeast colonies were subcultured on fresh SDA slants in McCartney bottles for identification and storage.

Identification of *Candida* species:

Specimens were identified using CHROMagar *Candida* (France) and API 20C System (Analytab Products, USA) according to earlier procedures (11, 12).

Statistical analysis: Chi-Square test was used to analyze the results.

Results

Five *Candida* species were isolated with varying distributions, namely, *C. albicans* (61.5, 73.7), *C. glabrata* (17.9, 7.7), *C. tropicalis* (7.7, 1.4), *C. stellatoidea* (5.1, 11.3), *C. parapsilosis* (2.6, 0.0 %) for pregnant and non-pregnant women (control), respectively (Fig. 1). The mean frequencies of isolation of *Candida* from women in the first, second and third

trimesters were 33, 68 and 30% respectively (Tab. I).

FIGURE 1: DISTRIBUTION FREQUENCY OF CANDIDA SPECIES IN SAMPLED POPULATION

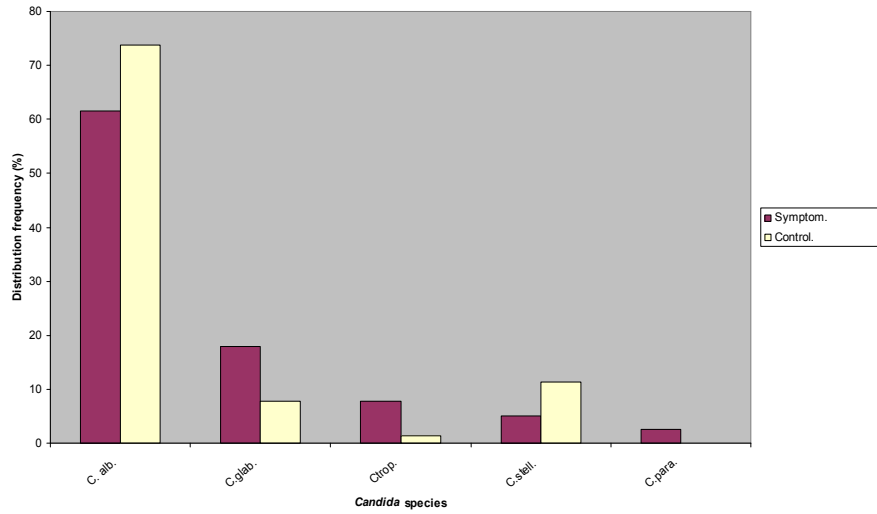


TABLE I: OCCURRENCE OF CANDIDA SPECIES ACCORDING TO AGE OF PREGNANCY.

Trimester (weeks)	Sample size	positive cultures		Positive cultures
		No.	%	% in total (87) samples
First (0 -12)	6	2	33.3	2.3
Second (13 -26)	32	22	68.8	25.3
Third (27 -40)	49	15	30.6	17.2

TABLE II: AGE DISTRIBUTION OF PATIENTS WITH CANDIDA SPECIES

Age (years)	Sample size		No. of positive cultures		% of positive cultures	
	Exper..	Control	Exper.	Control	Exper.	Control
17-23	29	20	15	7	51.7	35
24-30	46	26	20	12	43.5	46.2
31-37	11	13	4	6	36.4	46.2
38-44	1	1	-	-	-	-

TABLE III: OCCURRENCE OF CANDIDA SPECIES IN VARIOUS OCCUPATIONAL GROUPS

Occupation	Sample size		Positive cultures (No. and %)	
	Exper.	Control	Exper.	Control
Traders	16	33	11 (68.8)	14 (42.4)
Unskilled workers	13	9	8 (61.5)	6 (66.7)
Professionals	43	12	18 (41.9)	4 (33.3)
Full-time housewives	15	6	4 (26.7)	1 (16.7)

Table IV: Occurrence of *Candida* species in women who used contraceptive and those who did not.

Index	Sample size	No. of positive cultures	% of pos. cultures
Used contra.	36	21	58.3
Never used contra.	51	18	35.3

Age distribution of patients with *Candida* showed isolation rates of 51.7, 43.5, and 36.4% among age 17-23, 24-30 and 31-37 years, respectively (Tab. II). Among occupational groups, traders had the highest occurrence of *Candida* species (68.8%) while full-time housewives had the lowest (26.7%) as shown in Tab. III. Women who used contraceptive pill had higher occurrence (58.3%) than those who never used contraceptive (35.3%, Tab. IV).

Discussion

Out of the 87 samples 44.8% were positive while for controls 46.7% were *Candida*-positive. These rates are high and compare well with earlier reports (13, 14). *Candida albicans* was most frequently isolated; this distribution is

close to the result reported before (15, 16). Although *C. albicans* is widely reported in literature to be the most frequently isolated *Candida* species (4, 17) other *Candida* species are now being isolated with high rates (12, 14). *Candida albicans* produces protease, phosphatase and carbohydrates which enhance its attachment to human epithelium (18,19). Although such factors are also being studied in other *Candida* species, information on non-*albicans Candida* species is still scanty (19, 20).

Women in the second trimester had the highest occurrence of *Candida* infection (68.8%). It is likely that the conditions, such as pH and temperature, which encourage colonisation by *Candida*, are enhanced as age of pregnancy increases.

The distributions of infection among all age groups except 38 - 44 years were similar. These three age groups with high occurrence of infection were also the ones reported earlier to be the most affected; 20-25 years (21) and 21-30 years (12). Although, these authors' reports were based on non-pregnant women, the same factors namely, high sexual activity and child-bearing are attributable. This is corroborated by our results showing no significant difference ($p=0.05$) between age distribution of occurrence among pregnant women and non-pregnant women (control).

Traders had the highest occurrence; this agrees with earlier report (22). Traders usually have cash and due to their busy work, they might easily yield to self-medication and drug misuse which is a factor that increases the rate of colonisation by *Candida*. The difference in results for women who used contraceptives and those who never used was significant ($p = 0.05$). Use of oral contraceptive pill has been reported to increase the occurrence of *Candida* infection of the vagina (4, 5, 7).

There are indications that the factors studied here affect the rate of isolation of *Candida* species from pregnant women.

Acknowledgement

Authors are grateful to the staff of Suyi Hospital and Lahor Clinic for their

assistance during the collection of specimens.

References

1. Ako-Nai A.K., Kassim O.O., Adeniran M.O. and Taiwo O.. A study of urinary tract infections at Ile-Ife, Nigeria: East Afr. Med. J. 1993;70 (1): 10-14.
2. Brooks GF Butel JS Morse SA. Medical Microbiology, Third Edition. Appleton and Lange, Connecticut. 2004.
3. Buckley C.H. Fox H. Pathology for Gynaecologists, Second Edition. Edward Arnold, London.1991.
4. Carlsen G. The *Candida* Yeast Answer. *Candida* Wellness Center, Provo. 2001.
5. Dam M. Poch F. Levin D. High rate of vaginal infections caused by non *Candida albicans* *Candida* species among asymptomatic women: Med. Mycol. 2002, 40 (4): 383-386.
6. Ellepola A.N.B. Samaranayake L.P. The effect of limited exposure to antimycotic on the relative cell-surface hydrophobicity and the adhesion of oral *Candida albicans* to buccal epithelial cells: Arch. Oral. Biol. 1998, 43: 879 - 887.
7. Enweani I.B. Gugnani H.C. Okobia R.

- Ojo S.B. Effect of contraceptives on the prevalence of vaginal colonization with *Candida* species in Edo State, Nigeria: Rev. Iberoam. Micol. 2000, 18: 171 - 173.
8. Enweani I.B. Ogbonna C.I. Kozak W. The incidence of candidiasis amongst the asymptomatic female students of the University of Jos, Nigeria: *Mycopathologia* 1987, 99: 135 - 141.
9. Falagas M.E. Betsi G.I. Athaiasiou S. Probiotics for prevention of recurrent vulvovaginal candidiasis: a review: J. Antimicrob. Chemother. 2006, 58 (2): 266-272.
10. Garcia H.M. Garcia S.D. Copolillo E.F. Cora E.M. Banata A.D. Vay C.A. Torres R.A. Tiraboschi N. Famiglietti A.M. Prevalence of vaginal candidiasis in pregnant women, identification of yeast and susceptibility to antifungal agent: Rev. Appl. Microbiol. 2006, 38 (1): 9 -12.
11. Grigoriu D., Delacretaz J. and Borelli D. Medical Mycology, Hans Huber, Toronto.1987.
12. Gugnani H.C. Nzelibe F.K. Gini P.C. Chukwudebelu W.O. Njoku-Obi A.N. Incidence of yeasts in pregnant and non-pregnant women in Nigeria: *Mycoses*, 1989, 32 (3): 131-135.
13. Houang E.T. Chu K.C. Koehler A. Chen A.T.F. Use of CHROMagar - *Candida* for genital specimens in the diagnostic laboratory. *J Clin Pathol* 1997,50 (7): 563-565.
14. Kuhn D.M. Mukherjee P.K. Clark T.A., Pujol C., Chandra J., Hayjeh R.A., Warnock D.W., Soll D.R. Ghannoum M.A. *Candida parapsilopsis* characterization in an outbreak setting. *Emerg. Infect. Dis.* 2004, 10(6): 1074 - 1081.
15. Okonofua F.E. Ako-Nai K.A. Dighitoghi M.D. Lower genital tract infections in infertile Nigerian women compared with controls. *Genit. Med.*1995, 71(3): 163-168.
16. Okungbowa F.I. Biology and diversity of *Candida* species isolated from the human genitourinary tract in some Nigerian cities. PhD Thesis, University of Benin,Nigeria. 2002.
17. Okungbowa F.I. Isikhuemhen O.S. Dede A.P.O. The distribution frequency of *Candida* species in the genitourinary tract among symptomatic individuals in Nigerian cities: Rev. Iberoam. Micol. 2003, 20: 60 - 63.
18. Pichova I. Pavikova L. Dostal J. Dolej E. Hrukova-Heidingsfeldova O. Weber

- J. Rumi T. Souek M. Secreted aspartic proteases of *Candida albicans*, *C. tropicalis*, *C. parapsilosis* and *C. lusitaniae*; inhibition with peptidomimetic inhibitor. *Europ J Biochem* 2001, 268: 2669-2677.
19. Shwebke K. Hitlier S.L. Oxford textbook of medicine. Fourth Edition. Oxford Publishers, London. 2003.
20. Slope J.D.Hellman D.B. Ladensen P.W. Petty G.B. Traut A.T. The principles and practice of medicine. Third Edition. Appleton and Lange, Connecticut. 1996.
21. Vidotto V. Mantoan B. Pugliese A. Ponton J. Quindos G. Aoki S. Ito-Kuwa S. Adherence of *Candida albicans* and *C. dubliniensis* to buccal and vaginal cells: *Rev. Iberoam. Micol.* 2003, 20: 52-54.
22. Wenjin Q. Yifu S. Epidemiological study on vaginal *Candida glabrata* isolated from pregnant women: *Scand. J. Infect. Dis.* 2006, 38 (1): 49-54.

Visit our website: <http://www.ajol.info/journals/ajcem>