

Full Length Research Paper

Risk factors for vaginal candidiasis among women attending primary health care centers of Jos, Nigeria

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Vaginal candidiasis is a common complaint among women of different age groups in any society whether or not they are sexually active. Although it is both treatable and mild, when left untreated, is a possible risk for acquisition of HIV/AIDS as well as other complications. The study was set to detect *Candida* organisms in female genital discharge in order to improve treatment of vaginal candidiasis in current syndromic management of abnormal vaginal discharge. A prospective study of female genital swabs collected from Primary Health Care Centers, Jos, and analysed for microscopy, culture and sensitivity in Jos University Teaching Hospital, December 2006 to December 2007. Data on epidemiologic indices were collected from the patients, using structured interviewer-administered questionnaires. Four hundred and twenty *Candida* species were detected, constituting 60% (n = 420) of 700 female genital discharge samples of microbial etiology in a total of 1000 female genital samples received. The distribution of vaginal candidiasis according to age was highest in young adults aged 21 to 30 years with 43% (n = 180) of the total 420 cases. Pregnant women presented with Vaginal candidiasis constituted 40% (n = 168) of the total 420 cases. Other risk groups included the immune-suppressed with 24% (n = 101); group on hormonal therapy 15% (n = 63) and broad spectrum antibiotics users 16% (n = 67). The result shows that *Candida* species has assumed the role of the most common cause of vaginitis, with *Candida albicans* as the most prevalent species. Vulvo-vaginal candidiasis was common in the young adults of age range 21 to 30 years, pregnant mothers, immune-suppressed, contraceptive and broad spectrum antibiotic users. We therefore recommend prevention, early diagnosis and prompt treatment of vulvo-vaginal candidiasis especially among the risk groups in order to avert its complications and reduce HIV transmission.

Key words: Vaginal candidiasis, risk factors, microscopy, culture, sensitivity.

INTRODUCTION

Vaginal candidiasis (VC) is a common type of vaginitis, a gynaecologic disorder that manifests with an odorless curdy white discharge ("cottage cheese") in the female lower reproductive tracts with pruritus, irritation, dysuria or dyspareunia (Nwokedi and Anyiam, 2003; Osoba and Lufade, 1973). It is a common complaint among women of different age groups in any society whether or not they are sexually active. Some studies have shown high

preponderance of vaginal candidiasis in infective vaginal discharge among which studies included 52.5 and 60% isolation rate respectively, of *Candida* species (Nwokedi and Anyiam, 2003; Sobel et al., 1998).

Risk factors for vaginal candidiasis are factors that do not seem to be a direct cause of the disease, but seem to be associated in some way. Having a risk factor for VC makes the chances of getting a condition higher but does not always lead to vaginal candidiasis. Also, the absence of any risk factor or having a protective factor does not necessarily guard one against getting vaginal candidiasis (Sobel et al., 1998). Some risk factors for VC include pregnancy, poorly controlled diabetes, oral contraceptive,

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antibiotics, immune suppression, douches, perfumed feminine hygiene sprays, topical antimicrobial agents, tight clothing, tight underwears, thyroid disorders and corticosteroid (John, 2000).

Vulvo-vaginal candidiasis is caused by the fungus *Candida albicans* in approximately 85% of cases, while other species such as *Candida glabrata*, *Candida krusei*, *Candida tropicalis* and *Candida stellatoidea* rarely cause vaginitis (Van Dyck et al., 1999). *Candida* species are usually of endogenous origin and may be transmitted by sexual partners. Changes in the vaginal environment are usually necessary before the organism can induce pathological effects.

Although VC is both treatable and mild, when left untreated, is a possible risk for acquisition of HIV/AIDS as well as other complications (UNAIDS, 2003). Other complications include pelvic inflammatory disease, infertility, ectopic pregnancy, pelvic abscess, menstrual disorders, spontaneous abortion and premature birth. It is now well established that the presence of infective vaginal discharge greatly facilitates transmission and acquisition of HIV between sexual partners (FMOH, 2005; Abebe et al., 2001).

Therefore, there is a need for prevention, early diagnosis and prompt treatment of this common condition especially among the risk groups, in order to avert the complications and reduce the transmission of HIV. Laboratory support is necessary for a differential diagnosis or to confirm the clinical diagnosis of vaginal candidiasis.

MATERIALS AND METHODS

This descriptive study was carried out from December 2006 to December 2007 in PHC facilities of Jos. The PHC centers were selected by simple balloting. Approval of the study protocol was obtained from the Ethics Committee of Jos University Teaching Hospital. Further permission was obtained from local government councils and the primary health care departments. Consent of the patients was received and they were assured of strict confidentiality of responses. Structured interviewer-administered questionnaire was then introduced which includes serial number, date, age, address, educational status, marital status, occupation, last menstrual period, hormonal therapy (yes/no) (if yes, type-), antibiotics (yes/no) (if yes, type-), chronic illness (yes/no) (if yes, type-), and douching? (yes/no). Data were collected from the patients using an interviewer-administered questionnaire. Endo-cervical and high-vaginal samples were collected from the patients for laboratory analysis.

Laboratory procedure

Endo-cervical and high vaginal swabs were collected following aseptic precautions (Van Dyck et al., 1999). The genital swabs were immediately sent to the genital bench of medical microbiology and parasitology laboratory, Jos University Teaching Hospital where they were processed according to standard procedures (Van Dyck et al., 1999). Infection with *Candida* species was diagnosed by microscopy of a saline mount, gram-stained smear of material from the vagina and colonial growth on Sabouraud's dextrose agar.

Microscopy

A saline mount of the vaginal discharge specimen was covered with a cover-slip, and examined microscopically at $\times 400$ magnification, not only to detect yeast cells, but to exclude the presence of trichomonads and clue cells. Yeasts are round ovoid cells, 4 μm in diameter, showing typical budding (blastoconidia). Yeasts can easily be recognized on a gram stained smear as gram-positive cells.

Culture

Antibiotic-treated selective Sabouraud dextrose agar (SDA) was used as a growth medium for the isolation of *Candida* species. After inoculation of the clinical specimen, plates were incubated at 36°C for 2 days. Colonies of yeast cells are opaque white to creamy.

Identification

A simple test for the identification of *C. albicans* is the germ tube test. A colony was emulsified in 0.5 - 1 ml of sterile serum and incubated at 35 - 37°C for 4 h. *C. albicans* form germ tubes, short lateral hyphal filaments without any constrictions. It was examined every half hour for formation of germ tubes. A complete identification of *Candida* species was done by means of sugar assimilation test (auxanogram). The yeast was grown on a basal carbohydrate-free medium supplemented with essential vitamins and the test sugar. Each of the five test sugars namely, glucose (positive control), sucrose, trehalose, lactose and raffinose was dispensed into each plate. Plates were incubated at 30°C for 48 h. Growth produces an opacity in the medium and indicates the ability of the isolates to assimilate a sugar.

Trichomonas vaginalis was diagnosed by microscopy of a saline mount for the actively motile, spear shaped flagellates. *Gardnerella vaginalis*, an agent of bacterial vaginosis, was diagnosed by Whiff test and the evaluation of Gram stained vaginal smear at oil immersion power ($\times 1000$) objective for Clue cells, usually representing at least 20% of vaginal epithelial cells.

Cervical specimens were Gram-stained and cultures were inoculated on plates of chocolates and Thayer-Martins (Oxoid) media and incubated at 37°C in a moisturized candle extinction jar for 24 to 72 h. *Neisseria gonorrhoeae* was identified by typical colonial morphology, reactions to Gram-stain, positive Oxidase test, and sugar fermentation. The antibiotic sensitivity of isolates was tested by the agar diffusion method on chocolate agar plates using oxoid multi-discs with standard antibiotic concentrations. The samples collection, transportation and processing including microscopy, culture and biochemical tests were carried out according to recommended standard (Van Dyck et al., 1999).

The results were analyzed using SPSS 11.0 statistical software; chi-square (χ^2) was used to compare association between proportions and p-values < 0.05 were considered significant at 95.0% confidence level.

RESULTS

Four hundred and twenty *Candida* species were detected, constituting 60% of 700 female genital discharge samples of microbial etiology in a total of 1000 female genital samples received. *Candida* species were arranged according to the age groups of the patients ranging from 0 - 60 years. In the age range 0 - 10 years, 5 (1.0%) out of the 420 *Candida* species were detected,

Table 1. Distribution of *Candida* organisms in the infective female genital discharge in PHC centers of Jos, December 2006 to December 2007.

Age group in years	Abnormal female genital discharge	Determined microbial causes	Microbial organisms			
			<i>Candida</i> Species	<i>Candida albicans</i>	<i>Non-albicans</i>	Other microbial agents
0 - 10	10	6	5	4	1	1
11 - 20	220	173	103	93	10	70
21 - 30	390	279	180	150	30	99
31 - 40	270	210	100	80	20	110
41 - 50	90	30	30	25	5	-
51 - 60	20	2	2	2	-	-
Total (%)	1000	700 (100)	420 (60.0)	354	66	280 (40.0)

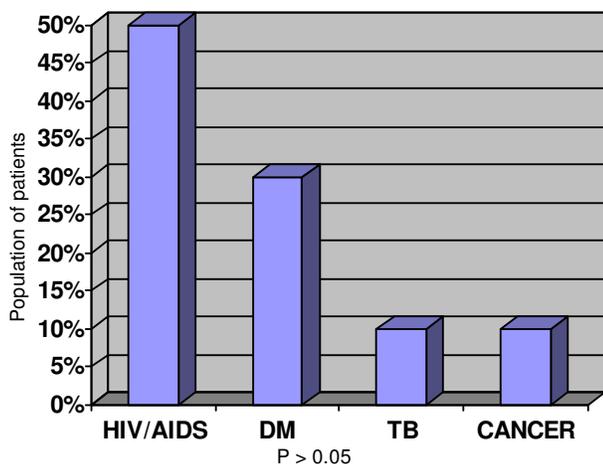
p > 0.05.

** 20 samples had multiple isolates.

Table 2. Distribution of vaginal candidiasis in relation to pregnancy, hormonal therapy and broad spectrum antibiotics among study population.

Age in years	Vaginal candidiasis	Pregnant women	Hormonal therapy	Antibiotics	Immune-suppressed	Undetermined factors
0 - 10	5	-	-	-	5	
11 - 20	103	38	15	12	26	
21 - 30	180	100	30	5	40	
31 - 40	100	30	18		20	
41 - 50	30	-	-	17	28	
51 - 60	2	-	-	-	2	
Total (%)	420 (100)	168 (40.0)	63 (15.0)	67 (16.0)	101 (24.0)	21 (5)

p > 0.05.

**Figure 1.** Vaginal discharge among the immunosuppressed in the study population.

in 11 - 20 years age group 103 (24.5%) *Candida* species were recorded, 21 - 30 years 18 (43.0%) *Candida* species, 31 - 40 years 100 (24.0%) *Candida* species, 41 - 50 years 30 (7.0%) *Candida* species and 51 - 60 years

only 2 (0.50%) *Candida* species were detected. The peak age bracket at risk was 21 - 30 years which constituted 180 (43.0%). There were multiple isolates in 20 genital samples (Table 1).

Pregnant women that presented with vaginal candidiasis constituted 40% (n=168) of the total 420 cases. Other risk groups included the immune-suppressed with 24% (n = 101); group on hormonal therapy 15% (n = 63), broad spectrum antibiotics users 16% (n = 67) and undetermined factors 5% (n = 21) (Table 2). In a population of 101 immunosuppressed patients with abnormal vaginal discharge; HIV/AIDS 51(50%), diabetes mellitus 30 (30%); tuberculosis 10 (10%) and cancer 10(10%); no statistical significant difference was observed (p > 0.5) (Figure 1).

DISCUSSION

The study was set to investigate vaginal candidiasis (VC) among women attending Primary Health Care centers in Jos, Central Nigeria, in order to achieve an effective medical management of this condition.

VC was a leading cause of abnormal vaginal discharge

in the study constituting 60% (n = 420) of the 700 female genital discharge of microbial causes out of the 1000 female genital samples. The result was similar to some earlier studies (Nwokedi et al., 2003; Sobel et al., 1998) which recorded 52.5 and 60% respectively. Predominance of candidiasis in the study was in the age group 21 - 30. The age decade of 21 - 30 is the most sexually active age group with highest risk of pregnancies, indulgence in family planning pills and immunosuppression due to HIV/AIDS. The inflammation of the vagina, as in any inflammatory STI (sexually transmitted infections), increases the risk of acquisition of HIV (Kenneth, 2003). Candidiasis is not usually sexually transmitted, though male contacts could be possibly involved, firstly that is, if they have symptoms, and secondly, if the woman is having recurrences.

C. albicans isolated was 354 (84%) out of the total 420 *Candida* species while *non- albicans* contributed 16% (n = 66). The result was in keeping with other studies (Van Dyck et al., 1999), which reported that vulvo-vaginal candidiasis is created by the fungus *C. albicans* in approximately 85% of cases, with *C. glabrata* being responsible for the remaining 15%. An explanation for the predominance of *C. albicans* in the study may be that these species are more predominant than other *Candida* species in the environment and hence more in the human body. More importantly, is their favorable survival ability in a depressed human immune system.

Pregnant mothers with vulvo-vaginal candidiasis in the study constituted 40% of the total cases seen. Some studies have implicated pregnancy as an important risk factor for vaginitis (Sobel et al., 1998; Omole-Ohonsi et al., 2006). The relationship between pregnancy and VVC indicates increase in hormonal influences and alteration in vaginal pH.

Immune-suppressed patients recorded 24% risk in the study. Systemic condition such as diabetic mellitus, HIV/AIDS, organ transplants and any chronic debilitating illness can increase the woman's chances of developing vulvo-vaginal candidiasis (John, 2000). Depressed cell mediated immunity provides a favorable condition for growth of *Candida* species such as in HIV/AIDS, whereas dysfunction of neutrophils and monocytes favors candidal growth in diabetes mellitus (Kenneth, 2003).

Broad spectrum antibiotic users posed a 16% risk to VVC in the study. Antibiotics and vaginal douching suppress normal bacterial flora and allow *Candida* organisms to proliferate. Of interest is that sulfonamide decrease neutrophil intracellular killing of *Candida* organisms, and tetracyclines and amino glycosides have been shown to decrease neutrophil phagocytosis (John, 2000).

Patients on hormonal therapy contributed 15% risk to vulvo-vaginal candidiasis. The study included patients on oral or injects, implants or IUCD. Hormonal therapy leads to an inter-play between hormonal influences and alteration in vaginal pH (Sobel et al., 1998). The normal mature vagina has a pH of 4.0.

Limitation in the study includes inability to identify most of the non- *albicans* species owing to lack of some test sugars.

We recommend prevention, early diagnosis and prompt treatment of VC especially among the risk groups in order to avert the complications and reduce HIV transmission.

Conclusion

The result shows that *Candida* species has assumed the role of the most common cause of vaginitis, with *C. albicans* as the most prevalent species. Vaginal candidiasis was common in young adults of age range 21 to 30 years, pregnant mothers, immune-suppressed, contraceptive and broad spectrum antibiotic users.

REFERENCES

- Abebe EA, Olumide M, Oke O (2001). A manual for Health workers on Syndromic Management of STI. National AIDS and STD control program; Federal Ministry of Health Abuja. pp. 3-7
- Federal Ministry of Health (FMOH) (2005). A manual of technical report on the National HIV/Syphilis sentinel survey among pregnant women attending Antenatal clinics in Nigeria. Abuja. Nigeria. pp. 1-11
- John EE (2000). Mycosis. In: Mandell G L, Bennett J E, Dollin R., (editors) Textbook of Principles and Practice of Infectious diseases. 5th Ed. New York: Churchill Livingstone, pp. 2291
- Joint United Nations Program on HIV/AIDS (2003). AIDS epidemic update. Geneva
- Kenneth OB (2003). STDs/HIV/AIDS -Challenge of next millennium. Nigeria. J. Genitourinary Med., 18: 18-30
- Nwokedi EE, Anyiam NN (2003). A study of high vaginal swabs in Kano Teaching Hospital .A preliminary report. Highland Med. Res. J., 1: 57-61
- Omole-Ohonsi A, Mohammed Z, Ihesiulor U (2006). Vaginal discharge in Pregnancy in Kano, Northern Nigeria. Nig. Med. Practitioner, 50: 68-71
- Osoba AO, Onifade O (1973). Venereal disease among pregnant women in Nigeria. West Afr. Med. J., 22: 23-25
- Sobel JD, Faro S, Force RW, Fox B (1998). Vulvovaginal candidiasis. Epidemiologic, diagnostic and therapeutic considerations. America J. Obstetrics Gynecol., 178: 203-211
- Van Dyck E, Meheus AS, Piot P (1999). A manual on Laboratory diagnosis of Sexually Transmitted Diseases. World Health Organization, Geneva.