GSC Advanced Research and Reviews

eISSN: 2582-4597 CODEN (USA): GARRC2

Cross Ref DOI: 10.30574/gscarr

Journal homepage: https://gsconlinepress.com/journals/gscarr/

(RESEARCH ARTICLE)

Check for updates

Prevalence of candidiasis among female patients attending Federal Medical Centre Owerri, Imo State, Nigeria

Joy Nkeiruka Dike-Ndudim *, Chizaram Winners Ndubueze, Joy Ogechi Ibeh and Emeka Okechukwu

Department of Medical Laboratory Science, Faculty of Health Sciences, Imo State University, Owerri, Nigeria.

GSC Advanced Research and Reviews, 2021, 09(01), 001–006

Publication history: Received on 20 August 2021; revised on 29 September 2021; accepted on 01 October 2021

Article DOI: https://doi.org/10.30574/gscarr.2021.9.1.0212

Abstract

In this study, the prevalence and associated risk factors of vaginal candidiasis among female patients attending the Federal Medical Centre, Owerri was investigated. High Vaginal Swabs (HVS) specimens were collected, cultured and *C. albicans* identified. The overall prevalence rate of vaginal candidiasis was 28.3%, with the highest rate of 33.3% observed among the age group 26-30years, while the lowest prevalence (17.1%) was among ages 31-45 years. Based on the nature of underwear, those who wore silk and very tight underwear recorded the highest prevalence (34.5% and 77.8%, respectively) while those who wore nylon and loose underwears had the least prevalence (23.1% and 24.2%, respectively). By level of education, primary school leavers had the highest prevalence (50%) while graduates had the lowest prevalence (23.9%). Those who had history of STI and those with vaginal discharge/discomfort had high prevalence of 30.8% and 30.1%, respectively. The study revealed the prevalence of vaginal candidiasis among general study subjects to be 28.3%; 34 out of 120, which was considerably higher than that of non-candidiasis; 86 out of 120. Low income, sexual activity, tight underwears, previous history of STI, ignorance, as well as poor personal hygiene have been implicated as possible risk factors. Efforts should therefore be made to educate females on the subject from time to time and access to quality social amenities, health care services, prompt diagnosis and treatment of STI and vaginosis should be improved upon. Microbiological analysis of HVS for all pregnant women during their first antenatal visit is also recommended.

Keywords: Vaginosis; *Candida albicans*; Underwears; Pregnant women; Nigeria

1. Introduction

Vaginal candidiasis; a yeast infection of the vulva and/or vagina caused by Candida species with *Candida albicans* being the major culprit, has been reported by researchers including Foxman *et al*., [1] as one of the common infections among women. Consistently, Emeribe *et al*., [2] revealed that about 90% of this infection is caused by *Candida albicans* and 10% by other species of *Candida.* This infection has been reported as the commonest cause of vaginitis, second to bacterial vaginosis [3] and generally, the infections occur when there is an imbalance in the pH of the vagina. The over-growth of this fungus in the vagina leads to a burning sensation in the vagina vulva, the production of heavy white/yellow curd-like discharge and/or an itchy vulva, puritus, dyspareunia, dysuria, irritation, soreness of the vulva and other discomforting symptoms that will ensure frequent hospital visits [2].

Vaginal candidiasis sometimes referred to as vulvo-vaginitis can be recurrent or relapsing and its prevalence has been observed to be on the increase [4]. Emeribe *et al*., [2] asserted that about 75% of females experience at least one episode of vaginal candidiasis during their life time. They added that most healthy women have at least 1-2 episodes of vaginal candidiasis during their reproductive years. Similarly, Eckert *et al*., [5] and Emeribe *et al.,* [2] proposed that about 50%

* Corresponding author: Joy Nkeiruka Dike-Ndudim
Department of Medical Laboratory Science, Faculty of Health Sciences, Imo State University, Owerri, Nigeria.

of college women will by the age 24- 25 years have had at least one episode of vaginal candidiasis investigated by a physician.

The case of vaginal candidiasis has been reported globally as a condition afflicting women. According to Rathod *et al*., [6] most of the reported epidemiological data available only revealed a lack of laboratory confirmation of the infection which further compounds the problem. In line with this, Rathod *et al*., [6] reported 5% prevalence among women in India. Klufio *et al*., [7] reported 25% prevalence among pregnant women in New Guinea, while Toua *et al*., [8] recorded 55.4% among pregnant women in Cameroon. In Nigeria, Umeh and Umeakanne [9], reported that about 28 million of women are affected annually. Consistently, the prevalence among female student in Bingham University was 26% [10]. This increase has been suggested to be due to multiple interacting risk factors for the infection. Extended use of broad spectrum antibiotics, pregnancy and underlying diseases such as poorly managed diabetes mellitus and HIV/AIDs, contraceptives, tightfitting clothing, poor female hygiene as well as the use of tampons and vaginal douching have been observed by researchers as risk factors or socio-economic factors associated with vaginal candidiasis [5]. Poorly associated risk factors including the use of intrauterine devices (IUDS), diaphragms, sponge, orogenital sex, condoms, intercourse and diet with high glucose content has been mentioned [11]. Though, evidence in favour of sexual transmission exists but has not been proven beyond doubt. However, 12-15% of men have been reported to develop symptoms including itching and rash on the genital area following sexual relation with infected women [12].

Vaginal candidiasis is an endemic problem globally. In Nigeria, little data is available on the prevalence especially among apparently healthy females. Most reported studies are limited to patients seen in hospital settings. This study was therefore, aimed at contributing to existing understanding of the natural history, risk factors and prevalence of candidiasis among female patients attending Federal Medical Centre Owerri, Imo state, Nigeria.

2. Material

2.1. Study area

This study was conducted at the Federal Medical Centre Owerri, Imo state, Nigeria. Owerri is the capital city of Imo State, Nigeria. Imo State is located in the South Eastern Region of Nigeria. It lies between latitude $6^{0}35^{1}$ and $7^{0}28^{1}$ North of the equator and longitude $5^{0}10^{0}$ and $6^{0}0^{1}$ East of the Meridean. Owerri consists of three Local Government Areas including Owerri Municipal, Owerri North and Owerri West. It has an estimated population of about 401,873 as of 2006 census and is approximately 100 square kilometres (40 sq mi) in area.

2.2. Ethical clearance and informed consent

With a letter of introduction from the department of Medical Laboratory science of Imo state University, formal consent was sought and obtained from the ethical approval committee of Federal Medical Centre, Owerri to use the hospital. The consent of all subjects was sought. All data were analyzed with Microsoft excel throughout the study.

2.3. Criteria

The selection of patients was done with the support of attending medical laboratory scientists of the laboratory department. Inclusion criteria were between age 16 and 45 years, with or without signs and symptoms of vulvovaginal discomfort, and not pregnant. Exclusion criteria were age under 15 or over 45 years, pregnant, diabetics, and menstruating. The procedure employed consisted of a questionnaire interview and the taking of patients' clinical history.

2.4. Questionnaire

Structured questionnaires were used by attending physicians to obtain relevant data such as age, nature of underwear, level of education, medical history and vaginal discharge/discomfort.

2.5. Sample collection

One hundred and twenty (120) high vaginal swab (HVS) samples were collected from female patients only. High vaginal swab samples were collected within a two month period covering August to September 2020, from patients attending the laboratory units of the Federal Medical Centre, Owerri. The samples were collected by a skilled medical laboratory scientist by inserting a sterile speculum and cotton wool swab into the vagina and rotated to collect vaginal discharge. The samples were properly packaged, labelled and transported immediately in Stuart transport medium to the medical microbiology laboratory of Imo State University for cultural and microbiological analysis.

2.6. Microscopic Examination of Samples

Ten percent (10%) Potassium hydroxide (KOH) wet mounts were made from the swabs and examined microscopically using a 40× objective lens for the presence of pseudo-hyphae and/or budding yeast cells suggestive of *Candida* [13].

2.7. Culture

An innoculum pool was made using each HVS specimen on Sabouraud Dextrose agar (SDA). Streaking was done with the aid of a sterile wire loop to recover isolate as discrete colonies and incubated aerobically at 37ºC for 72 hours. Yeast cells were identified using characteristic colonial morphology of *Candida* on SDA, gram staining and Germ-tube test [13].

2.8. Statistical Methods

Data generated from questionnaires and results of the laboratory analysis were entered into Microsoft Excel and analyzed using SPSS software (version 20; IBM Corporation, Armonk, NY, USA). Results obtained were reduced to percentages, tables, and a figure. The Pearson χ^2 test at a 95% confidence interval and 0.05 level of significance was used to determine the relationships between some sociodemographic/clinical data and prevalence rates.

3. Results

3.1. Prevalence of Candidiasis According to Age of the Study Subjects

A Total of 120samples were collected and examined. Out of 120 high vaginal swab (HVS) samples from female study subjects aged 15-45 with mean age of 29.8 screened for vaginal candidiasis, 30(25%) gave positive culture. The age distribution of vaginal candidiasis among female subjects screened showed that the age range 26-30 years had the highest prevalence of 15(33.3%). This was closely followed by subjects aged between 15-25 years with the prevalence of 10(25%) while the age between 31-45 years showed the prevalence of 5(14.3%). Statistical analysis on the prevalence of vaginal candidiasis is shown in table 1

Table 1 Age-related Prevalence of vaginal candidiasis

Age (yrs)	No. examined	No. Positive	No. Negative
15-25	40 (33.3%)	13(32.5%)	27(67.5%)
26-30	45 (37.5%)	15(33.3%)	30(66.7%)
31-45	35(29.2%)	6(17.1%)	29(82.9%)
TOTAL	120	34(28.3%)	86(71.7%)

3.2. Prevalence of vaginal candidiasis in relation to type of underwear and age distribution

Based on the data collected in the laboratory consent form on the nature of underwear the subjects usually put on, it was shown that out of the 120 subjects, 26 wore nylon kind, 29 wore silk and 65 wore cotton. After laboratory investigations, it was discovered that 6 subjects out of the 26 who wore nylon tested positive, 10 out of the 29 who wore silk tested positive and 18 out of the 65 who wore cotton tested positive as shown in table 2.

Also based on underwear tightness, those who wore very tight underwears showed the highest prevalence of 77.8% positive, followed by those who wore tight underwears (24.4%) and then loosed ones (24.2%).

Table 2 Prevalence of vaginal candidiasis in relation to the type of underwear

Type of underwear	No. examined	No. Positive	No. negative
Nylon	26	3(11.5%)	23(88.5%)
Silk	29	4(13.8%)	25(86.2%)
Cotton	65	26(40%)	39(60%)
TOTAL	120	33(27.5%)	87(72.5%)

Table 3 Prevalence of vaginal candidiasis in relation to the tightness of underwear

Under wear used	No. Examined	No. Positive	No. Negative
Tight	78	19(24.4%)	59(75.6%)
Very tight	9	7(77.8%)	2(22.2%)
Loosed	33	8(24.2%)	25(75.8%)
TOTAL	120	34(28.3%)	86(71.7%)

3.3. Prevalence of vaginal candidiasis in relation to level of education

Based on the data collected in the laboratory consent form on the education level of the subjects, those who studied up to tertiary, though with the highest population, had the lowest prevalence of candidiasis. Those in secondary level had a prevalence of 27.3% and the highest prevalence (50%) was seen amongst those who acquired only primary level of education.

Table 4 Prevalence of vaginal candidiasis in relation to level of education

Educational level	No. Examined	No. Positive	No. negative
Primary	16	8(50%)	8(50%)
Secondary	33	9(27.3%)	24(72.7%)
Tertiary	71	17(23.9%)	54(76.1%)
TOTAL	120	34(28.3%)	86(71.7%)

3.4. Prevalence of vaginal candidiasis in relation to history of STI

Out of the 120 subjects studied, 78 had previous history of candidiasis, out of which 24 tested positive. 42 had no medical history of candidiasis however, 10 tested positive as indicated in table 5.

Table 5 Prevalence of vaginal candidiasis in relation to history of STI

History of STI	No. Examined	No. Positive	No. negative
Yes	78	24(30.8%)	54(69.2%)
No	42	10(23.8%)	32(76.2%)
Total	120	34(28.3%)	86(71.7%)

3.5. Prevalence of vaginal candidiasis in relation to vaginal discharge/discomfort

Based on the data collected, it was shown that 83 out of the 120 subjects had vaginal discharge/discomfort, while 37 had none. Out of the 83 subjects that had vaginal discharge/discomfort, 25 tested positive and had the highest prevalence of 30.1%.

Table 6 Prevalence of vaginal candidiasis in relation to vaginal discharge/discomfort

Vaginal discharge/discomfort	No. examined	No. Positive	No. negative
Yes	83	25(30.1%)	58(69.9%)
No	37	9(24.3%)	28(75.7%)
Total	120	34(28.3%)	86(71.7%)

4. Discussion

This present study investigated the prevalence of vaginal candidiasis among female patients attending FMC Owerri, Imo State, Nigeria. The study was performed based on various parameters which included subjects age, type of under wear used, level of education, history of STI, and clinical symptom of vaginal discharge/discomfort.

Based on the age group of the subjects, it was observed that those between the ages of 26 - 30 had the highest prevalence, 33.3% of vaginal candidiasis, followed closely by those between the ages of 15 - 25 with a prevalence of 32.5% and the least was observed among ages of 31 - 45 (17.1%). High sexual activity, high incidence of antibiotics abuse and contraceptive usage associated with this age group may be responsible for the high prevalence recorded. This is also a pointer that sexual activity is a risk factor for VVC (vulvovaginal candidiasis) even though it is not a sexually transmitted disease. This supports the report of Emeribe *et al*., [2] and Ezeigbo and co-worker, [14], but in contrast to Alo *et al*., [15], who reported 36-40 years old women as the highest VVC (vulvovaginal candidiasis) prevalent age group.

Investigation relating to the type and tightness of the underwears the subjects wore, it was shown that those who wore cotton kind of underwear had the highest prevalence of vaginal candidiasis of 40% and also a higher prevalence of 77.8% was recorded for the use of very tight under wears. The use of synthetic under wears and tight under wears reduces airflow which may increase moisture and warmth status of vagina, thereby encouraging yeast infections. Some females have allergies to synthetic material which may cause debilitation that encourage yeast infections. Tight garments can also reduce healthy blood circulation. This agrees with the findings made by Nwadioha *et al*., [16] on the aetiologic agents of abnormal vaginal discharge among females of reproductive age in Kano, Nigeria.

Primary and secondary school groups gave a prevalence of 50% and 27.3% respectively, while tertiary degree holders had 23.9% prevalence. These tallies with the findings of Yadav and Prakash, [17] and Ezeigbo *et al*., [14]. Ignorance, low economic status, poor personal and communal hygiene, as well as hesitance to approach medical services may be responsible for the high prevalence of VVC among Primary and secondary school groups.

Women with previous history of STI and those presenting with vaginal discomfort had more cases of vaginal candidiasis. This report is in agreement with the findings of Jombo *et al*., [18].

5. Conclusion

This report revealed the prevalence of vaginal candidiasis among general test subjects to be 28.3%; 34 out of 120, which was considerably higher than that of non-candidiasis (86 out of 120). 20% prevalence obtained in this study is high. Low income, sexual activity, tight underwears, previous history of STI, ignorance as well as poor personal hygiene have been implicated as possible risk factors. Efforts should be focused on improving access to quality social amenities, health care services, prompt diagnosis and treatment of STI and vaginosis as well as increase in health and sex education for women via all possible routes. Microbiological analysis of HVS for all pregnant women during their first antenatal visit is also recommended.

Sufficient education programs on vaginal candidiasis should be carried out from time to time to reduce the prevalence of this disease. Also, females of all ages, especially below 35 years should be taught the importance of good personal hygiene, since they may be at the highest risk of infection.

Compliance with ethical standards

Acknowledgments

We would like to acknowledge the staff and students of the Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria, who assisted us throughout the period of this work.

Disclosure of conflict of interest

There is no conflict of interest.

Statement of informed consent

The informed consent of all the participants, was sought accordingly.

References

[1] Foxman B, Barlow R, D'arcy H, Gillespie B, Sobel JD. Candida vaginitis: Self-reported incidence and associated costs. Sex Transmission of Diseases. 2008; 27: 230-235.

[2] Emeribe AU, Nasir IA, Onyia J, Ifunanya AL. Prevalence of Vulvovaginal candidiasis among nonpregnant women attending a tertiary health care facility in Abuja, Nigeria. Research and Reports in Tropical Medicine. 2015; 6: 37-42.

[3] Al-Ahmadey ZZ, Mohamed SA. Vulvovaginal candidiasis: Agents and its virulence factors. Microbiology Research International. 2014; 2: 28-37.

[4] Ferrer J. Vaginal candidiasis epidemiological and etiological factors. International Journal of Gynecology and Obstetrics. 2000; 200-203.

[5] Eckert LO, Hawes SE, Stevens CE, Koutsky LA, Eschenbach DA, Holmes KK. Vulvovaginal candidiasis: Clinical manifestations, risk factors, management algorithm. Obstetrics Gynecology. 2004; 92: 757-765.

[6] Rathod SD, Klausner JD, Krupp K, Reingold AL, Madhivanan P. Epidemiologic features of Vulvovaginal candidiasis among reproductive-age women in India. Infectious Diseases in Obstetrics and Gynecology. 2012; 1: 1-5.

[7] [7] Klufio CA, Amoa AB, Delamare O, Hombhanje M, Kariwiga G, Igo J. Prevalence of vaginal infections with bacterial vaginosis, Trichomonas vaginalis and Candida albicans among pregnant women at the Port Moresby General Hospital Antenatal Clinic. Papua New Guinea Medical Journal. 1995; 38: 163-71.

[8] Toua V, Djaouda M, Gaké B, Menye DE, Christie EA, Tambe E, Akindoh VV, Njiné T. Prevalence of Vulvovaginal candidiasis amongst pregnant women in Maroua (Cameroon) and the sensitivity of Candida albicans to extracts of six locally used antifungal plants. International Research Journal of Microbiology. 2013; 4: 89-97.

[9] Umeh EU, Umeakanne BI. HIV/vaginal Candida co-infection: Risk factors in women. Journal of Microbiology and Antimicrobials. 2010; 2: 30-35.

[10] Ishaku MJ, Yami AL, Zamfara, KA, Nganjiwa SG. The prevalence of Vaginal Candida colonization among female students in Bingham University. British Microbiology Research Journal. 2016; 12: 1-7.

[11] Akingbade OA, Akinjinmi AA, Awoderu OB, Okerentugba PO, Okonko IO. Prevalence of Candida albicans amongst women attending health Centres in Abeokuta, Ogun State, Nigeria. New York Science Journal. 2013; 6: 53-59.

[12] Sobel JD, Faros OD, Forces RW, Foxman B, Ledge WJ, Nyirjesy PR, Foxman P, Summer PR. Vulvovaginal candidiasis: Epidemiological, diagnostic and therapeutic considerations. American Journal of Obstetrics and Gynecology. 1998; 178(2): 203-211.

[13] Berkow R, Beers M, Fletcher AJ, Chir B, Bogin R. The Merck Manual of Medical Information. Home Edition. Merck Manual of Diagnosis and Therapy M.D. 2001.

[14] Ezeigbo OR, Anolue FC, Nnadozie IA. Vaginal Candidiasis Infection among Pregnant Women in Aba, Abia State, Nigeria. British Journal of Medicine & Medical Research. 2015; 9(3): 1-6.

[15] Alo MN, Anyim C, Onyebuchi AK, Okonkwo EC. Prevalence of asymptomatic co-Infection of candidiasis and vaginal trichomoniasis among pregnant women in Abakaliki, South-Eastern Nigeria. J Nat Sci Res. 2012; 2(7): 87–91.

[16] Nwadioha SI, Egah DZ, Alao OO, Iheanacho E. Risk factors for vaginal candidiasis among women attending primary health care centers of Jos, Nigeria. Journal of Clinical Medical Research. 2010; 2(7): 110-113.

[17] Yadav K, Prakash S. Prevalence of Vulvovaginal Candidiasis in Pregnancy. Global Journal of Medicine and Medical Sciences. 2016; 4(1): 108-116.

[18] Jombo GT, Opajobi SO, Egah DZ, Banwat EB, Denen AP. Symptomatic vulvovaginal candidiasi and genital colonization by Candida species in Nigeria. Journal of Public Health Epidemiology. 2010; 2(6): 147-151.