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THE PREVALENCE OF *VAGINAL CANDIDIASIS* AMONG FEMALE STUDENTS IN NOVENA UNIVERSITY, DELTA STATE, NIGERIA

Tanimowo, Omotola Williams[*1],
Ogbeke, Ayomide Joy1,Nwachukwu, Perpetua Ugonna1,Igborgbor, Jude Chukwuemeka2,Utebor Egiliwebi Kester[2]

[1]Biological Sciences Department, Novena University, Ogume.Delta State.Nigeria.
[2]Biology Department, College of Education, Agbor.P.M.B. 2090, Agbor Delta State. Nigeria.

ABSTRACT
This study was carried out to investigate the prevalence of Vaginal Candidiasis among female university students in Novena University, between April and July 2011among volunteers in this institution. Standard plating methods- pour plates and spread plate methods were used to isolate the fungus from Higher Vaginal Swabs samples. A well-structured questionnaire was used to elicit information on life style and eating habit of the respondents. C. albicans was more isolated from the age range 20- 29, followed by the age group <20, while it was least isolated in the age groups 50- 59 and ≥60 years. The respondents from which C. albicanswas isolated was (30.9) less than those without the infection (69.1). 50% of the respondents from all the age groups experience vaginal discharge, itching and burning sensation. C. albicans was isolated from respondents from all the age groups except 50- 59 and ≥60 years. At least 90% of the respondents from all age groups studied uses oral contraceptives. 17 respondents infested with C. albicans in their genitals, only 5.5% claimed never to have had sexual intercourse, while the remaining25.4% have had sexual intercourse often or regularly have sexual intercourse. Candida albicans infection in this study was observed to occur in virtually all age groups studied; the absence of the infection in some age groups is likely due to sample size. It is therefore recommended that further study be carried out to define the role of antibiotic usage and some other factors in causing candidiasis.

Keywords *Vaginal candidiasis, Candida albicans, age groups, female, prevalence.*

Correspondence to Author

Tanimowo, Omotola Williams

Department of Biological Sciences, Novena University, Ogume.P.M.B. 2, Kwale, Delta State. Nigeria

Email: jesumowo0630@yahoo.com

INTRODUCTION

Vaginal candidiasis is an inflammatory condition caused by yeast, predominately*Candidaalbicans*. This condition results in severe genital itching, vaginal odour and abnormal discharge.Vagina candidiasis is a common gynecological finding among women worldwide. It has been found out that up to 75% of the sexually active women have at least, at a time experienced symptomatic vaginal candidiasis[1].

The commonest organism implicated is *Candidaalbicans,* and the predisposing factors include; prolonged or repeated use of antibiotics,Steroid hormone medication, hormone replacement therapy (HRT),contraceptive and changes in mucus lining of the vagina could encourageCandida to flourish[1].

Vaginal candidiasis is a common clinical syndrome being found in 28% of women attending sexually transmitted disease clinics, obstetrics, and gynecology unit and outpatient department[2]. In most cases the vagina is observed to be inflamed with symptoms of itching, severe irritation with discharge. Occasionally, there may be no discharge or there may be discharge without inflammation. The problem of vaginal discharge is probably the most frequently narrated complaint of women of reproductive age group[2].

The three most common types of vaginal infections in adult women are; vaginal candidiasis, Trichomoniasis, and Non-specific vaginitis[2] . Moreover, candidiasis may be caused by different species of Candida which include; *Candida albicans, C. glabrata, C. dubliniensis C. parapsilosis, C. guilliermondi C. lusitaniae and C. tropicalis*[3].

Candida albicans is both the most frequent colonizer and responsible for most cases of Vaginal Candidiasis. Nevertheless, over the last decades there have been report demonstrating an increment in the frequency of cases caused by non-albicans species with *Candida glabrata*consistently being the leading species. The only well proven predisposing factor are pregnancy, diabetes mellitus and the use of broad spectrum antibiotics as well as oral contraceptives with high estrogen content[4].

Women who have vaginal candidiasis may experience the following symptoms; itchiness in the anal and genital area that intensifies at night, vaginal discharge ranging from white and cheese-like to mucopurulent, inflamed, split, and abraded skin, redness and swelling around the vagina, pain with urination or intercourse.

There are some categories of persons that are prone to vaginal candidiasis, they include: pregnant women, HIV/AIDS patient, diabetes patient, oral contraceptive usersand broad spectrum antibiotics users. Although there exist a misconception about candidiasis being a Sexually Transmitted Disease (STD), however, it should be noted that candidaisis is not a classic STD, though it is seen mostly commonly in sexually active people. Candidiasis is a mild infection without the serious complications associated with other STDs it is however, responsible for considerable discomfort in affected women. In a study on the prevalence of STD among pregnant woman, the most common organism isolated was *Candida* sp. (37.8%)[5].

Prevalence of Candida infections is frequently correlatedwith immunological status of host[6],the infection being the commonest fungal infection associated with HIV infection in women[7]. It was report that *C. albicans* occurs as one of the common complication of HIV infection affecting HIV[8]. Self-reported history of vulvovaginalcandidiasis ranges from 20% among students to 45% of a general population sample to 72% of family practice clinic users[9].

Vaginal candidiasis is routinely diagnosed without laboratory testing, and this results in as much as 50% misdiagnosing. Data on incidence where diagnostic data were based on definite clinical and mycological findings are exceptional[3]. Most studies suggest a vaginal candidiasis prevalence of 5%- 15%, depending on the population studies. It affects most females at least once during their lives at an estimated rate of 70% - 75% of whom 40% - 45% will experience a recurrence. Statistical data from England have shown a sharp increase in the annual incidence of CV, from 118 per 100,000 women to 200 per 100,000 women during the last 20years[3].

The increase of vagina candidiasis in the globe and indeed in Nigeria was an impetus for this study. This study was therefore aimed at ascertaining the age range and life style of young women that are prone to vaginal candidiasis, as well as isolating and identifying*Candidaalbicans* from HVS samples.

MATERIALS AND METHODS

Source of Samples/ Data

Higher Vaginal Swab (HVS) was used for the laboratory studies. These samples were obtained from 55 randomly selected female students, who willingly volunteered themselves in Novena University, Ogume, Amai campus, Delta State.

The information on the life styles of the respondents were obtained with structured questionnaire. The first section of the questionnaire elicited information on socio-demographic characteristics (age, education, occupation, marital status, gravid status and religion). Likert- styled scale options were used to obtain data on the feeding habit, health history and sexual life style of the respondents. The maximum points for health, based on four likely complications of candidiasis stood at 24points. The maximum points for feeding habit also stood at 24 points, likewise sexual activities and the use of oral contraceptive.

Collection of HVS Sample

HVS and Urine samples were collected for this study. The HVS samples were collected using sterile swab sticks, while the urine samples were collected in sterile universal bottles. The vaginal swabs were collected by the help of experienced hospital personnel in Novena University Health Centre. The swab was then inserted into the vagina about two inches, and gently rotated for 10 to 30 seconds in the vagina. The swab was then withdrawn without touching the skin immediately inserted aseptically into the package.

The procedure of Enweani*et al.,* was followed for the isolation of fungi from HVS samples[10]. Sabourand dextrose agar (SDA) (BioChemika, Germany), was prepared according to the manufacturer's instructions. The powder was weighed according to manufacturer's instruction, dissolved in distilled water and autoclaved at 121^{o}c for 15minutes and cooled to about 45^{o}c. After cooling, the medium was dispensed into sterile Petri dishes and dried in inverted position in the oven. Thereafter, sterile distilled water was introduced into the HVS tubes and gently agitated. 0.1ml of the solution(wet preparation) was then cultured on the SDA by Streak plate method. The plates were incubated at37^{o}c for 24-48 hours, and then for three days.

Identification Protocol

Microscopy (Wet Preparation)

Developing colonies were examined microscopically using 10% KOH preparation. This was done by introducing a colony, with the aid of inoculating loop into 1-2 drops of 10% KOH, on a grease- free microscopic glass slide, and then covered with cover slip and viewed with x10 and x40 objective lens.

Gram Stain

The Gram stain was done to identify the ovoid budding and gram- positive yeast cells. Smear of the Candida isolates were aseptically prepared using sterile distilled water, and heat fixed on a clean slide and Gram stained. Following which the prepared slides were examined with oil immersion objective (X100) and observed. *Candida albicans* appeared as large cocci or ovoid violet colored cells.

Data Analysis

Tables were generally used for the presentation of the data obtained from this work. Descriptive statistics(frequency and percentage) were used to analyze the data for presence of *Candida albicans* in HVS and urine symptoms experiences and demographic characteristics, while correlation analysis was performed for the determination of the relationship between the consumption of garlic, yogurt and the use of Oral contraceptives and the occurrence of Candida Infection.

RESULTS

Table 1 shows the demographic data of the respondents. The table shows that respondents in the age range 20- 29 dominated the sample size studied, while those at the age range 50- 59 are the least. Concerning education, 89.7% of the respondents have attained secondary level, while none have attained to the tertiary education level. 63.8% of the respondents are single while the remainingare married. Only 8.6% are pregnant, while the others are not and lastly on religion 82.8% are Christians followed by Islam (8.6%) and traditional (3.4%).

Table 2 and Figure 1, shows the age distribution and rate of isolation of *Candida albicans*from female genital specimens of the 55 respondents. *C. albicans* was more isolated from the age range 20- 29, followed by the age group <20, while it was least isolated in the age groups 50- 59 and ≥60 years (Table 2). The results obtained also showed that in all, the respondents from which *C. albicans*was isolated was less than those without the infection. Figure 1further confirms this.

Table1: Demographic Characteristics

Variable		N	%
Age	<20	12	20.7
	20- 29	23	39.7
	30- 39	13	22.4
	40- 49	4	6.9
	50- 59	1	1.7
	≥60	2	3.4
Education Level	None	1	1.7
	Primary	2	3.4
	Secondary	52	89.7
	Tertiary	0	0
Occupation	Civil Servant	10	17.2
	Student	45	77.6
	House wife	0	0
Marital Status			
	Single	37	63.8
	Married	18	31.0
	Separated	0	0
	Divorced	0	0
Gravid status			
	Pregnant	5	8.6
	Non- Pregnant	50	86.2
Religion			
	Traditional	2	3.4
	Christianity	48	82.8
	Islam	5	8.6

Table 2: Age Distribution and Rate of Isolation of *Candida* Spp. from Female Genital Specimens

Age (Years)	Candida present (%)	Candida absent (%)	Total (%)

<20	9.1	12.7	21.8
20- 29	14.5	27.3	41.8
30- 39	5.5	18.2	23.6
40- 49	1.8	5.5	7.3
50- 59	0.0	1.8	1.8
≥60	0.0	3.6	3.6
Total	**30.9**	**69.1**	**100**

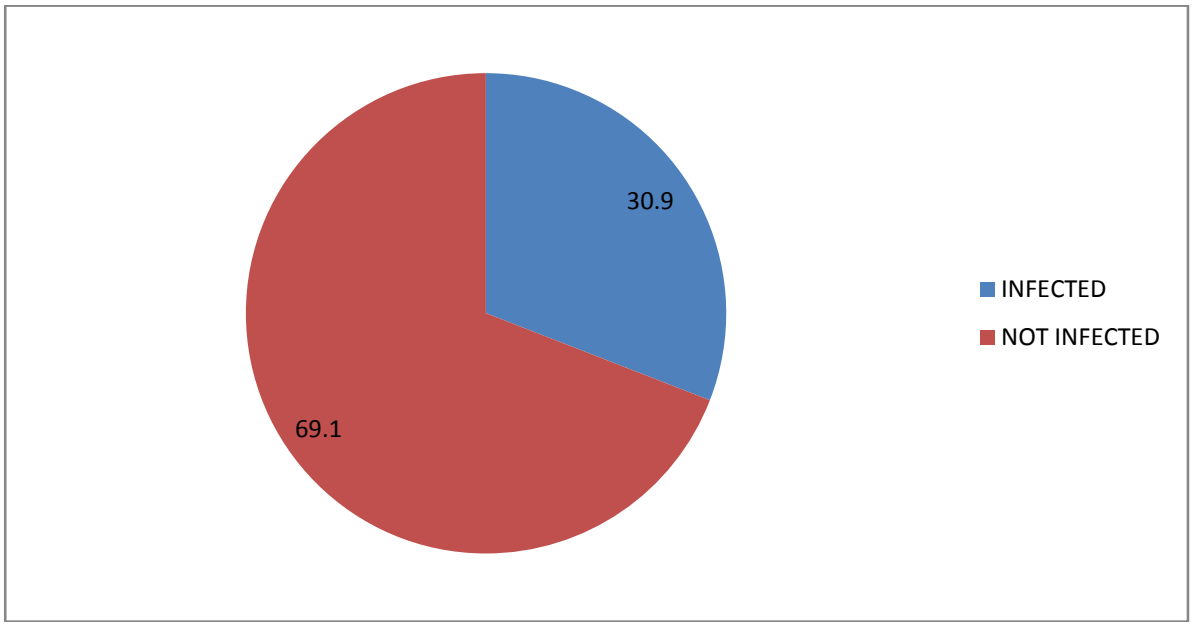

Figure 2: Overall Isolation of *Candida albicans* from Female Genital Specimens

Table 3: Prevalence of *Candida albicans*from Female Genital Specimen (HVS) In Relation to Age Group of Women Screened

AGE GROUP	NO. OF PATIENT EXAMINED	NO. INFECTED
<20	12	5
20- 29	23	8
30- 39	13	3
40- 49	4	1
50- 59	1	0
≥60	2	0

Table 4 showed that more than 50% of the respondents from all the age groups experience vaginal discharge, itching and burning sensation, which are symptoms of vaginal candidiasis, while none of the age groups are diabetic. The table also showed that *C. albicans* was isolated from respondents from all the age groups except 50- 59 and ≥60 years, although at a rate of less than 50% (Table 4). Concerning the use of oral contraceptive, at least 90% of the respondents from all age groups studied uses oral contraceptives. All the respondents take milk and yogurt, while more than 50% often take garlic (Table 5).

Table 6 showed that there was a strong correlation between the occurrence of *C. albicans* in urine and HVS samples studied. It also showed that there is a negative correlationbetween the consumption of yogurt and the occurrence of *C. albicans* in female genital samples.

Table 7 showed that of all the 17 respondents infested with *C. albicans* in their genitals, only 5.5% claimed never to have had sexual intercourse, while the remaining25.4% have had sexual intercourse at one time or the other, out of which 3 (5.4%) regularly have sexual intercourse.

Table 4: Relationship between Vaginal Candidiasis and Symptoms

Age	No.	Symptoms				*C. albicans*
		Itching	Burning Sensation	Vaginal Discharge	Diabetes	
<20	12	6	2	4	0	5
20- 29	23	14	4	15	0	8
30- 39	13	13	4	13	0	3
40- 49	4	1	0	1	0	1
50- 59	1	1	1	1	0	0
≥60	2	1	0	1	0	0

Table 5: Relationship between the Occurrences of C. albicans and Feeding Habit

Age	No.	Yogurt	Garlic	Milk	Oral Contraceptive	*C. albicans*
<20	12	11	9	1211		5
20- 29	23	20	20	23	23	8
30- 39	13	12	12	1113		3
40- 49	4	4	3	144		1
50- 59	1	1	1	1	1	0
≥60	2	1	1	22		0

Table 6: Relationship between Urine Infection, Garlic, Yogurt, Oral Contraceptive Consumption; Sex and HVS Candida Infection

VARIABLES	CORRELATION COEFFICIENT (r)
Garlic Consumption	0.033
Yogurt Consumption Oral Contraceptive Usage	-0.201
Sexual Intercourse	0.027
	-0.273*

Significant: ***p< 0.01; *p< 0.05***

Table 7: Frequency of Candidiasis among the Sexually Active

Variables	Frequency(N= 17)	Percentage

Never	3	5.5
Very Rare	5	9.1
Rare	6	10.9
Often	2	3.6
Very Often	1	1.8
Total	17	30.9

DISCUSSION AND CONCLUSION

The results on age distribution for *Candidaalbicans* infection in female genital specimens suggest that some age groups are more prone to the infection than others are.This could be could be due to some environmental factors such as life style. The results obtained with regards to age of respondents is in line with the report on the effect of contraceptives on the prevalence of vaginal colonization with *Candida* species[10], in that the age groups 20- 25and 25- 30 years had the highest prevalence of vaginal candisiasis and hence, there was significant relationship between the ages of the volunteers sampled and the prevalence of vaginal colonization by drug- resistant *Candida* species among college-Age women.

In a study on the the prevalence of sexually transmitted diseases among pregnant women in Ilorin, Nigeria, it was reported that those between ages 19- 24years were most affected, however, *Candida* spp. Was isolated from all age groups, although it is not a sexually transmitted disease[5]. This is however contrary to the report of this work in that *C. albicans* was only isolated from four out of the six age groups studied. The variation is likely due to the sample size. This result is also in line with the report on symptomatic vulvovaginal candidiasis and genital colonization by Candida species in Nigeria. It was reported that the isolation of *Candida* species was higher in ages 20- 29 and 30- 39yaers old[1].

On the symptoms of vaginal candidiasis, studied in this work- vaginal discharge, itching and burning sensation, theresults obtained showed that more than half of the respondents experience the earlier mentioned symptoms. This result is in line with the report, which stated that itching and discharges were clinical features that were more associated with vulvovaginal candidiasis among pregnant women in Gboko, Nigeria[11]. It also agrees with the same report, in that the symptoms of vaginal candidiasis were listed to include: itching, soreness, burning sensation abnormal vaginal discharges and dyspareum[1].

With respect to the use of oral contraceptives, it was observed that almost all the respondents use one form of oral contraceptives. It was reported that there was a significant relationship between the type of contraceptive used and the prevalence of vaginal colonization in the volunteers studied[10]. In addition, the contraceptive users had a prevalence of over 50% of vaginal colonizationcompared with about 40% for non-contraceptive users. This could be attributed to the presence of estrogen and progesterone, which are hormones found in the contraceptive that increased glycogen in the vagina, thus exposing it to the activities of lactobacilli. The lactobacilli are widely believed to play a role in the conversion of gylcogen to lactic acid thus raising the pH of the vagina.

Theincrease in pH reduces theactivities of the bacterial flora while favouring that of the yeasts including *Candida* sp.[10]. In addition, it was reported that among the volunteers using oral contraceptives, a higher prevalence of vaginal candidiasis was observed as compared with those using injectable and vaginal tablets. Still on the use of contraceptives, It was also reported that HIV infected women who were currently on contraceptive pill (oral) appeared not to be at increased risk of yeasts infection[12].

The environment in which Candida thrives is acidic in nature, and this acidity inhibits the body's ability to absorb vitamins and minerals and it limits enzyme production of digestive proteins. Limited enzyme production leads to symptoms of indigestion. It is therefore evident that in order to maintain a healthy body, free of an overgrowth of Candida, the foods that are eaten must be foods that promote healthy Candida levelsin the body. Ideal diet for sufferers of Candida infection should include: garlic, yogurt, onions etc.[13].The consumption of garlic by more than half of the respondents might have contributed to the low level of isolation of Candida in the female genital specimens collected.

Similarly, the negative correlation observed between the consumption of yogurt and the isolation of Candida probably suggests that the intake of yogurt reduced the risk of contracting Candida infection in the respondents[13].

With respect to sexual intercourse or activities and the prevalence of candidiasis among the respondents, the study suggests that candidiasis is not a sexually transmitted disease (STD). This is in line with the report that although *Candida*sp was isolated fromall groups studied, it is not strictly a STD[5]. It however disagrees with the report that sexual activities have been suggested to be associated with vulvovaginal candidiasis[9]. This therefore suggests that the increased in prevalence of candidiasis may be associated more with personal habits rather than sexual intercourse.

CONCLUSION AND RECOMMENDATION

In conclusion, *Candida albicans* infection in this study was observed to occur in virtually all age groupsstudied, the absence of the infection in some age groups is likely due to sample size. The infection is evidently common among women as previous studies have shown, particularly the women within the age groups that are sexually active. The symptoms of this infection bring a great discomfort on the sufferers. Hence, is important for female (students in the university in particular) to be aware of how to prevent and treat vaginal candidiasis. This will help prevent the discomfort created by this infection and reduce further damage that candidiasis may cause to the immune system.

It is therefore recommended that further study be carried out to define the role of antibiotic usage and HIV infection in causing vaginal candidiasis, since these two factors are major contributors to the onset of vaginal candidiasis.

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