

Full Length Research Paper

## Prevalence of vaginitis and vaginosis among University of Calabar female students

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The prevalence of vaginosis and vaginitis among the female students of the University of Calabar was studied between September and December, 2005. High vaginal swabs were collected from each respondent. Questionnaires were administered to the respondents and collected together with the specimen. A total of 1000 respondents aged between 15 and 35 years were examined. The survey revealed that 70% were infected with vaginosis and vaginitis, among these, 51% had single infection while 19% had mixed infections. On the other hand, 330 (64.71%) had candidiasis while 180 (35.29%) had bacterial vaginosis. Genital discharges, 400 (51.28%) was the commonest symptom while a combination of itching, burning and genital discharge 170 (21.79%) was the least. Contraceptive related prevalence shows that condom (54.72%) was the most common contraceptive used while injectable (1.89%) was the least. Statistical analysis of the data revealed a significant difference ( $P < 0.05$ ) between sexually active (aged groups 21 to 30) and sexually inactive (age group 15 to 20 and 31 to 34). The findings of this study show that there is high prevalence rate of vaginitis and vaginosis among the study population and a significant number of asymptomatic patients being vaginitis and vaginosis positive. This reveals the sanitary conditions of the female toilets in the hostels.

**Key words:** Vaginosis, candidiasis, bacterial vaginosis, contraceptives, vaginitis.

### INTRODUCTION

Bacterial vaginosis (BV) is a polymicrobial superficial vaginal infection involving loss of the vaginal lactobacilli and an over growth of anaerobes (Hill, 1993; Curran, 2010). In the United States, BV is currently the most cause of vaginitis, accounting for 40 to 50% cases in women of childbearing age (Hill, 1993; Hay, 1998). This infection is believed to be caused by proliferation of a number of organisms including *Gardnerella vaginalis*, *Mobiluncus* species, *Mycoplasma hominis* and *Peptostreptococcus* species (Kent, 1991; Hill, 1993). Bacterial vaginosis is so named, because no polymorphonuclear cells are present in the vaginal discharge, but a decrease in the normal vaginal flora and a rise in vaginal

pH. This leads to overgrowth of *G. vaginalis* and vaginal anaerobic bacteria causing white or grey discharge with amine odor.

Determining the prevalence of BV is difficult, because one third to three quarters of affected women are asymptomatic (McCue, 1989; Sobel, 1990; Schwebke, 2007). In addition, reported prevalence varies based on the population studied. BV has been reported in 15 to 19% ambulatory gynecological patients, 10 to 80% pregnant patients and 20 to 41% of patients in sexually transmitted clinics (Sobel, 1997; Bump and Buesching, 1985).

Vulvovaginal candidiasis is the second most common cause of vaginitis in the United States and the most

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common cause in Europe (Kent, 1991). An estimated 75% of women have vulvovaginal candidiasis at some time in life and approximately 5% of women who have current episodes (Monif, 1985; Foxman, 1990; Sobel, 1993). *Candida albicans* is the infecting agent in 80 to 90% patients (Sobel, 1997; Horowitz and Mardh, 1997).

Risk factors for uncomplicated vulvovaginal candidiasis have been difficult to determine (Sobel, 1993). Establishing *Candida* species as the cause of vaginitis is difficult because 50% of asymptomatic women have *Candida* spp. as part of their endogenous vaginal flora (Sobel, 1993; Egan and Lipsky, 2000). Trichomoniasis is considered the most common curable sexually transmitted disease. About 70% of the infected women do not develop symptoms. This is a serious problem in pregnant women, because it can lead to preterm delivery.

Unsanitary conditions of toilets and bathrooms and the large female student's population in the hostels can be sources of vaginitis and vaginosis. With the high number of candidiasis and pelvic inflammatory diseases reported by the students who visited area medical facilities, no meaningful research has been carried out to determine the etiology of these infections and the prevalent rate in this university community. This research work is therefore aimed at determining the level of vaginitis and vaginosis, the prevalent rates and the age groups of the female students affected most, importantly the percentage of asymptomatic students who develop the disease. The results of this research could be used in the intervention of the development of good toilet facilities and the need for regular medical check up by the students.

## MATERIALS AND METHODS

### Study area

This study was carried out in the University of Calabar Medical Center, Calabar Cross River State. Laboratory analysis was carried out in the pathology laboratory of the University of Calabar Teaching Hospital.

### Subjects for the study and location

Both symptomatic and asymptomatic student patients who visited the University Medical Center were examined. These included sexually active (age groups 21 to 30) and sexually inactive (age groups 15 to 20 and 31 to 35).

### Ethical approval

The individual student's consent was sort for and those who consented were included in the study. Also, the Hospitals Management Board of Cross River State and University of Calabar Medical Center ethical approval was sort for and approval was obtained before the research.

### Administration of questionnaires and sample collection

The questionnaire was designed to obtain information on the

students sexual history, use of contraceptives, personal vaginal hygiene such as douching, washing with soap, use of suppositories, use of fragrance, washing with water only, or non-of the above. Also, types of toilets used such as septic tank flush system, pit toilet, bush and the cleanliness of the different toilet facilities. Immediately after filling the questionnaires, specimens were collected from the patients by a medical doctor and other health workers. These students come from different social and economic backgrounds.

### Sample collection

Vaginal wall swab samples were collected from 1000 female students that made up the study population of aged between 15 and 35 years, who must have had sex at least once and were either symptomatic or non-symptomatic. Health workers (nurses and medical laboratory scientists and including a medical doctor) were recruited as field assistants to help in collection of samples. Two vaginal swabs were collected using sterile Evepon (Evepon Industries Ltd, Nigeria) swab sticks for each respondent. Disposable specula were used by carefully inserting into the vagina and pressing on the vaginal wall to keep the vagina open for the specimen to be taken. A sterile swab stick was then introduced through the speculum and used to swab the vaginal wall directly. The samples were properly labeled bearing code number, data and time of collection.

### Laboratory analysis

A drop of isotonic saline solution was introduced into each pack of the sterile swab stick and was mixed by shaking vigorously to wet the swab. A drop of the mixture of each sample was placed on a clean grease free slide, covered with cover slip and examined microscopically under 10 and 40x objectives (Cheesebrough, 1992), potassium hydroxide (KOH) preparation and whiff test were done.

Ten percent of KOH solution was added to the second swab stick containing specimen of the vaginal discharge and mixed by shaking vigorously to wet the swab. A drop of the mixture of the sample was placed on a clean grease free slide covered with covered slip and air dried or flame-dried before examination under 10 and 40 x objectives (Reilly, 1991).

During the preparation of KOH slide, a whiff test was preformed. This was done by dropping KOH solution to the vaginal secretion (Hill, 1993).

### Litmus testing

The pH level was determined by placing litmus paper in the pooled vaginal secretion, the colour change of the litmus paper was compared to the colour in the standard chart and their corresponding pH were recorded (Carr et al., 1998).

### Gram staining

Smears of the vaginal swab samples were prepared and gram stained. The slides were viewed under the microscope.

### Culture of specimens

Each vaginal swab sample was cultured on brain heart infusion agar, blood agar, modified Thayer-Martin agar and Sabouraud Dextrose Agar (SDA) using streaking technique (Cheesebrough, 1992). All cultures were incubated at 37°C for 18 to 24 h except

**Table 1.** Prevalence rate among total population studied.

Age	No. examined	Single infection	Mixed infection	Total infected (%)	Total un-infected (%)
15-20	150	60	30	90 (60.00)	60(40.00)
21-25	550	310	110	420 (76.4)	130 (23.6)
26-30	250	130	40	170 (68.00)	80 (32.00)
31-35	50	10	10	20 (40.00)	30 (60.00)
Total (%)	1000	510 (51)	190 (19)	700(70)	300 (30)

**Table 2.** Prevalence of single infection.

Age	No. examined	No. infected	Candidiasis	<i>G. vaginalis</i>
15-20	150	60	20	40
21-25	550	310	210	100
26-30	250	130	90	40
31-35	50	10	10	0
Total	1000	510 (51)	330 (64.71)	180 (35.29)

**Table 3.** Prevalence of mixed infection.

Age	No. examined	No. infected	Candidal vaginitis/Bacterial vaginosis	Trichomoniasis candidiasis	<i>G. vaginalis/T. vaginalis</i>
15-20	150	30	20	0	10
21-25	550	110	50	40	20
26-30	250	40	30	10	0
31-35	50	10	10	0	0
Total	1000	190 (19)	110 (57.89)	50 (26.32)	30 (15.79)

**Table 4.** Symptom related prevalence.

Age	No. examined	No. infected (%)	Itching burning (%)	Genital discharge (%)	Itching burning and genital discharge (%)	No. of symptom (%)
15-20	150	90 (60)	20	50	20	60
21-25	550	490 (89.09)	140	250	100	60
26-30	250	170 (68.00)	40	80	50	80
31-35	50	30 (60.00)	10	20	0	20
Total	1000	780 (78)	210 (21)	400 (40)	170 (17)	220 (22)

culture on SDA which were incubated at 27°C for 48 h and modified Thayer-Martin plates incubated at 35°C in candle jar for 18 to 24 h.

#### Statistical analysis

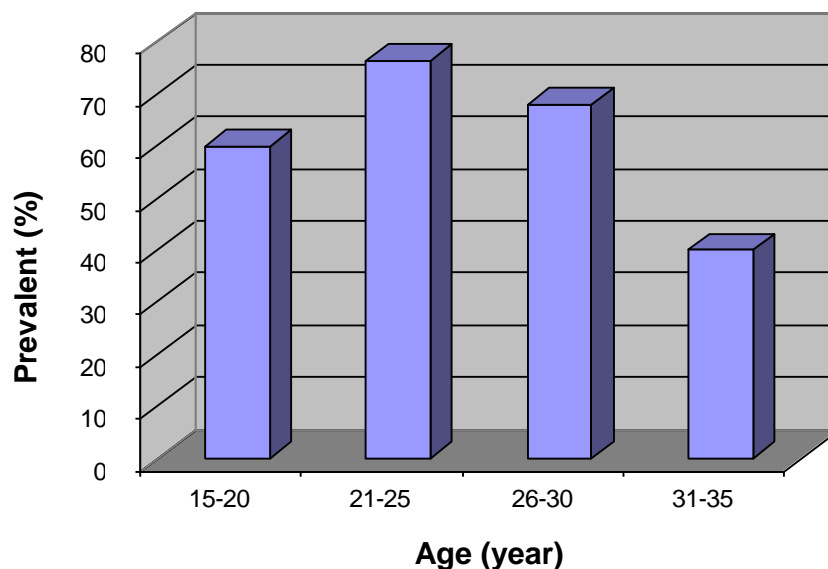
Data were obtained from sample collected and information supplied in the questionnaire, data obtained from users and non users of contraceptive and an overall prevalence of the infections amongst female students of the University of Calabar was subjected to Chi square statistical analysis as described by Phillips (1993). SSPA ver.11.50 was used. Results were reported as significant or non-significant.

## RESULTS

The findings of this study are presented in Tables 1 to 5 and Figure 1. As shown in Table 1, among the 1000 students population studied, 70% of the respondents were infected with both single and mixed infections, 51% had single infection while 19% had mixed infections. Table 2 shows the infection rates of *C. albicans* and *G. vaginalis*. A total of 330 (64.71%) had candidiasis vaginitis while only 180 (35.29%) had bacterial vaginosis caused by *G. vaginalis*. The highest prevalence of the infection (76.36%)

**Table 5.** Contraceptive related prevalence.

Age	No. examined	Contraceptive employed	Oral contraceptive	Condom	Suppository	Injectible	IUD
15-20	150	50 (33.33)	20	30	0	0	0
21-25	550	300 (54.55)	80	170	50	0	0
26-30	250	100 (64.00)	50	80	20	10	0
31-35	50	20 (40.00)	10	10	0	0	0
Total	1000	530	160 (30.19)	290 (54.72)	70 (13.21)	10 (1.89)	0

**Figure 1.** Age related percent prevalence of vaginitis and vaginosis.

was observed among respondents, aged 21 to 25 years, while the least (40%) was observed among respondents, aged 31 to 35 years. Statistical analysis of the data revealed a significant difference ( $P < 0.05$ ) in the prevalence of infectious vaginitis among the female students of the University of Calabar.

The most prevalence vaginal infection in this study was candidiasis (64.71%). Tables 2 and 3 show a pattern of infection according to age. The prevalence of different vaginal microorganisms such as *T. vaginalis*, *G. vaginalis* and *Candida* spp isolated from respondents in this study are shown in Tables 2 and 3. A total of 510 (51%) out of 70% infected respondents had single infections, of this number, 330 (64.71%) had candidiasis and 180 (35.29%) had *G. vaginalis*. On the other hand, 190 (19%) of the respondents had mixed infections, of this number, 110 (57.89%) had *C. albicans* and *G. vaginalis*, while 50 (26.32%) had *T. vaginalis* and *C. albicans* and only 30 (15.79%) had *G. vaginalis* and *T. vaginalis*. A total of 80 (48.11%) had *T. vaginalis* out of the number infected.

Table 4 summarizes symptoms related prevalence among the respondents. As shown, 78% were symptomatic while 22% were asymptomatic. Out of the symptomatic respondents, 490 (89.09%) were seen among

respondent of ages 21 to 25, 170 (68.00%) among ages 31 to 35. Table 4 also shows that the highest symptoms related prevalence, 400 (51.28%) was found among respondents with genital discharge, while 17 (21.79%) was observed amongst respondents with itching, burning and genital discharge.

Table 5 shows contraceptive related prevalence of vaginosis among the respondents. As shown, a total of 530 (53%) respondents used contraceptive. Of this number, 290 (54.72%) used condom, 160 (30.19%) used oral contraceptive, 70 (13.21%) used vaginal suppository, 10 (1.89%) used injectibles and none of the respondents used intrauterine devices. The table also shows that out of 530 respondents who used contraceptive, 300 (54.55%) of the contraceptive were used by respondents of ages 21 to 25, 160 (64.00%) were used by respondents of ages 26 to 30, 50 (33.33%) were used by respondents of ages 15 to 20, while the least 20 (40.00%) were used by respondents of ages 31 to 35 years.

## DISCUSSION

The findings of this study have established the existence

of vaginosis and vaginitis among female students of the University of Calabar with a high prevalence of 81%. Vaginitis constitute a major public health problem of both developed and developing countries. Although they are the most commonly reported gynecologic disease (Kent, 1991), the number of cases increases daily. The impact of the high prevalence of vaginosis among University of Calabar female students has not been given adequate attention.

The 81% prevalence of vaginal infections (vaginitis) in this study was observed to occur mostly by BV and VC. This rate is less than that reported by Sobel (1997) and Sobel (1997a) who reported a 90% rate. The lower prevalence rate in the present study is probably due to asymptomatic cases and also the fact that the previous workers considered both vaginitis and vaginosis and also considered only single infection besides socio economic factors and other physical factors of the previous workers.

The prevalence of single infection observed in this present study corroborates the finding of Horowitz and Mardh (1997) who reported a prevalence of about 30% cases of candidiasis in Scandinavian countries. The finding of this study establishes the fact that candidiasis is the highest cause of vaginitis among the female students of the university. This can be attributed to the unhygienic facilities in the female hostels. However, it also supports the fact that vaginosis has more than one cause as observed in a mixed infection.

From this study, there is a correlation between symptoms and prevalence of vaginosis. Genital discharge was found to be the most common symptom followed by itching or burning sensation. The study showed a positive correlation between irritation and candidiasis which is in line with reports by Carr et al. (1998). The relationship between the use of contraceptive and the prevalence of vaginosis was also assessed. The findings of this research showed that condom (barrier contraceptive) was the most common contraceptive used by students. This is due to the high rate of awareness that condom can prevent sexually transmitted disease (STD). Using the information obtained from the questionnaire, physical examination, the findings of microscopic examination of the wet mount, KOH preparation and the result of the pH litmus test, it was noted that, the respondents who use condom and vaginal suppository had a relatively higher number of white blood cells (WBCs) and epithelial cells, which may have resulted in irritation, inflammation and ulceration.

The second most common contraceptive observed in this study was oral contraceptive (pill), it was noted that *C. albicans* and large amount of epithelial cells were frequent in specimen of respondents who use oral contraceptive, this is in accordance with the studies of Horowitz and Mardh (1997) who reported that progestin and estrogen content of oral contraceptive increases vaginal epithelial thickness leading to an increase in vaginal pH,

thus, changing the vaginal flora. They also demonstrated estrogen receptor on *C. albicans* organism. This suggests that certain oral contraceptives might increase the risk of developing candidiasis. Although the pathogenic mechanism is unclear, it was established by other researchers that oral contraceptives users have a 50 to 80% increase risk of recurrent vulvovaginal candidiasis. The findings of this study also show that BV, candidiasis and trichomoniasis are implicated as the most frequent causes of vaginitis

The 22% of the students who were infected but had no symptoms in this study is significant. Though, this is lower than about 85% of women affected with BV who have no symptoms reported by Stoppler (2010). This low prevalence could have been due to the social life styles social classes of the students examined. The implication of these findings has brought to the fore sanitary conditions of toilets in the hostels which may partly be responsible for the infection. Also, more attention will be drawn to high reported cases of pelvic inflammatory disease (PID) which is mostly caused by BV and candidal vaginitis. According to Sweet (2000), Ness et al. (2004) and Atashili et al. (2008), bacterial vaginosis has been shown to increase the risk of adverse gynecological and obstetrical outcomes such as pelvic inflammatory disease (PID) and upper genital tract infections, preterm delivery and late miscarriage.

## Conclusion

The results obtained from this study have revealed a high prevalent rate of vaginitis among the students. The environmental conditions in the hostels and other factors identified in this study could have contributed to the high prevalent rate. This research has also revealed that contraceptive use can cause changes in the vaginal environment allowing pathogens to proliferate. The implication of the high prevalence rate of asymptomatic female students with vaginosis found in this study could have been due to the students not going for regular medical check up. This can lead to serious infertility problems in the students. Bacteria from the vagina can travel into the uterus causing serious damage to the fallopian tubes. Regular check ups are therefore necessary for every woman whether sexually active or not.

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