Prevalence of Bacterial Vaginosis among Patients with Vulvovaginitis in a Tertiary Hospital in Port Harcourt, Rivers State, Nigeria

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Authors' contributions

This work was carried out in collaboration between the authors. Author KTW designed the study and wrote the protocol. Author FAO wrote the first draft of the manuscript. Authors JAI and NR managed the literature search and performed statistical analysis. Author ILO managed the analysis of the study. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: *Bacterial vaginosis* (BV) is one of the three common causes of vulvovaginitis in women of child bearing age, usually resulting from alteration the normal vaginal microbiota and PH. Common clinical presentation includes abnormal vaginal discharge, pruritus, dysuria and dyspareunia.
Aims: To determine the prevalence of bacterial vaginosis among symptomatic women of child bearing age that attended various outpatient clinics in the university of Port Harcourt teaching Hospital.
Methods: Two hundred (200) women with vulvovaginitis who attended various clinics in the hospital were recruited for a cross sectional study using the Nugent scoring system for bacterial vaginosis after obtaining their consents. Questionnaires were used to obtain their demographic information and common presenting symptoms.
Results: One hundred and two (102) of the patients had bacterial vaginosis with a prevalence of

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51%. The commonest affected age group is between 26-30 years. The most common presenting symptom was vaginal discharge (50%). Majority of the patients were undergraduates and so had secondary education.

Conclusion: Bacterial vaginosis is the commonest cause of vulvovaginitis especially among the sexually active age groups and such should be considered top among other causes of similar sign and symptoms especially in cases of syndromic management.

1. INTRODUCTION

1.1 Background Information

Bacterial vaginosis (BV) is a condition that results from the alteration in the normal microbiota and pH of the vagina following an overgrowth of certain bacteria [1]. Bacteria vaginosis is the most common vaginal infection in women aged 15-44 years [2] and much more in sexually active women. Though the etiology is not clearly known but certain risk factors have been implicated such as multiple sex partners or frequently changing sex partner, recent antibiotic over use and the use of intrauterine devices. Others are douching, tub bathing or the use of intra vaginal hygiene products [3].

Various organisms have been implicated in the development of bacterial vaginosis, most of which are the normal flora of the vagina. Infected patients present with mild to moderately increased abnormal vaginal discharge which may appear greyish white and adheres to the vaginal wall [3]. There may also be a strong fish- like odor, especially after sex with associated dysuria or dyspareunia. other symptoms include tenderness, itching or burning sensation in the vagina [3,4]

It is unknown how sexual activities contribute to the development of Bacterial vaginosis as there has been no report to determine whether treated or untreated sex partner will affect the transmission. However, bacterial vaginosis have been reported in 20 to 41% of patients attending sexually transmitted clinics (STI) [5] and bacterial vaginosis can enhance the chances of contracting other sexually transmitted infections [6]. It is not contracted from toilet seats, beddings or swimming pools. However, the causative bacteria of bacterial vaginosis have been found in the rectum of 20–40 percent of healthy women and this suggests that the disease could also be due to autoinfection [6]. Bacteria vaginosis is a common finding in pregnancy and it is also associated occasionally with some complications such as preterm delivery, pelvis inflammatory disease, amniotic fluid infection or with low birth weight, [7,8].

Prevalence of bacterial vaginosis between 4.9% and 36% has been reported from some European and American studies, in the United States, NHANES reported a prevalence of 29.2%(21.2 million) among women ages 14–49, based on a nationally representative sample of women who participated in NHANES 2001–2004 [3,4,9,10], a study by Bhalla et al. in Delhi India, also reported a prevalence of 32.8%, [11].

Although several studies on bacterial vaginosis have been done in Nigeria, but majority were focused on pregnant women and only very few studied symptomatic women, this could have led to the erroneous believe that all or almost abnormal vaginal discharge is due to Candida. This study aimed at establishing the true status of this disease condition in Port Harcourt and creating more awareness among physicians to aid appropriate therapy.

Worthy of note is the fact that various studies have shown that bacterial vaginosis enhances the acquisition and transmission of a range of sexually transmitted infections including human immunodeficiency virus. It has also been associated with increased risk of pelvic inflammatory disease, miscarriages and preterm delivery, [9,12].

The prevention of bacterial vaginosis will include minimal vaginal sexual intercourse limited to a single sexual partner, with the avoidance of douching and can be treated effectively with antibiotics. Complications of untreated bacterial vaginosis may range from contracting other sexually transmitted infections, pelvic inflammatory diseases, tubal infertility to preterm or low birth weight babies. Despite being a common infection in women, there is no record of any research carried out in our hospital except a study on bacteria vaginosis as a cause of tubal infertility. The objective of this study was to find

out the prevalence of Bacterial vaginosis among women with vulvovaginitis attending our hospital. The ethical approval for this study was obtained from the University of Port Harcourt.

2. LITERATURE REVIEW

Bacterial vaginosis is a vaginal disease condition thought to arise from a shift in the ecology of the endogenous microbiota of the vagina [1,2]. When the delicate balance of normal vaginal microbiota characterized mainly by the lactobacilli specie is disrupted and replaced by an overgrowth of various bacterial species including *Gardnerella vaginalis, Mycoplasma hominis, Ureaplasma urolyticum* and anaerobic organisms such as *Prevotella, Porphyromonas, Peptostreptococcus* and *Mobiluncus.* Affected patients are usually sexually active and often complain of a fish-like odor immediately after sex, also most patients notice a mild to moderate milky abnormal vaginal discharge [1,2].

Bacterial vaginosis is the most common cause of vulvovaginal symptoms among women of childbearing age, accounting for 40 to 50 percent of all cases [3], most cases do occur in sexually active women, with an increase in prevalence rates based on the overall number of sexual partners [3,9]. Study findings have noted that most women with bacterial vaginosis (84%) were asymptomatic and even though most sexually naïve women were rarely affected, they could also develop the infection, [12,9].

Risk factors for developing bacterial vaginosis are dependent on a number of socio-demographic characteristics, such as initiating sexual activity at an early age, having numerous, anonymous, or frequently changed sex partners, smoking, ethnicity (African Americans and Mexican Americans are at higher risk), and even frequent douching [12,13].

In healthy women, the vaginal microbiota are mainly *Lactobacillus* species, which maintains a pH between 3.8 and 4.5 to prevent the overgrowth and invasion of pathogenic bacteria by competitive exclusion, competition for nutrients, and release of antimicrobial substances such as hydrogen peroxide, organic acids, bacteriocins, and biosurfactants [1,2]. Thus, when vaginal lactobacilli are depleted, vaginal pH increases allowing the overgrowth of these bacteria that are inhibited by the presence of Lactobacillus organism [1,2,14]. The anaerobic organisms involved produce large amounts of proteolytic carboxylase enzymes, which break down vaginal peptides into a variety of amines that are volatile, malodorous and associated with increased vaginal transudation and squamous epithelial cell exfoliation resulting in the typical clinical features observed in patients with bacterial vaginosis. The rise in pH also facilitates adherence of *Gardnerella vaginalis* to the exfoliating epithelial cells [1,2,3].

Various criteria have been suggested as yardstick for diagnosis of bacterial vaginosis,according to Amsel et al. [15], the demonstration of at least three of the following four characteristics—homogeneous thin discharge, presence of clue cells on microscopy, increased vaginal pH >4.5, and positive whiff test—can be diagnostic the disease [1,2]. Alternatively, the Nugent scoring system of evaluating vaginal Gram-stained smears can be used, this method which is more objective than the Amsel method, involves the observation and quantification of organisms seen on Gram stained smears of vaginal secretions. Based on the morphology of the organisms seen, they are identified as *Lactobacilli spp., Gardnerella* spp *and Mobiluncus* spp*.* These organisms are then quantified according to the number counted per high power field and scored appropriately using the Table 1 [2,16].

The Nugent scoring system for Gram-stained vaginal smears is a more accurate means of diagnosing bacterial vaginosis than cultures because of the high prevalence of *Gardnerella vaginalis* among healthy individuals [2,16].

Treatment of bacterial vaginosis before caesarean delivery, total abdominal hysterectomy or insertion of an intra uterine device is recommended, commonly recommended treatment includes metronidazole 0.75% gel daily for 5 days, clindamycin 2% cream 5 g daily for 7days or clindamycin ovules 100 mg daily for 3 days. Oral drugs such as clindamycin 300 mg orally twice daily for 7 days or metronidazole 400 mg twice daily for 5 to 7 days are used for treatment. For prophylactic treatment prior to surgical interventions, rectal metronidazole 1 g or intravenous 500mg metronidazole can be given [12].

3. METHODOLOGY

This is a descriptive cross sectional study involving women who presented to the Medical Microbiology laboratory, University of Port

Harcourt teaching hospital, Port Harcourt for high vaginal swab(HVS) test with clinical details or diagnosis suggestive of vulvovaginitis. The patients were recruited concurrently until a sample size of 200 including 20% attrition was achieved. The sample size was calculated using formulae $N=Z^2p(1-p)/d^2$ by Araoye [17], based on prevalence of 28.1% reported among women with tubal factor infertility in Nigeria [18]. High vaginal swab was collected from each of the patients with the aid of sterile speculum according to the standard protocol [19] after the procedure was explained and consent obtained from each participating patient. Samples obtained were immediately sent for analysis which included whiff test, pH determination and gram staining and basic demographic information which included; age, educational level and presenting symptoms were obtained from the questionnaires given to each participating patient. The study duration was three months (May to July 2016), the referrer outpatients clinics included; the sexually transmitted infection (STI), Family medicine, Obstetrics and Gynaecology clinics. The Nugent method was used to determine the positive and negative cases [16].

3.1 Laboratory Procedures

3.1.1 Whiff tests

A portion of the undiluted vaginal discharge from the swab was placed on the surface of a clean glass slide, then one drop of 10% KOH was added directly to the vaginal sample on the slide.

The slide was held and the vapour layer (whiff) above the surface of the slide was gently fan and was assessed for the presence of volatile amines which have a fishy odor.

3.1.2 Results

Positive: Fishy odor following addition of 10% KOH to the vaginal sample.

Negative: Absence of a fishy odor following addition of 10% KOH to the vaginal sample.

3.1.3 pH determination

With the aid of swab stick, vaginal discharge was gently applied over the surface of the pH test paper and colour reaction was immediately observe on the pH paper and this was compared with the colour of the pH chart to determine the pH of the sample.

3.1.4 pH Result

The pH colour chat ranges between 4.5 and 7.5. The normal vaginal pH in women of child bearing age is 4.5. Elevated pH is seen in *Trichomoniasis* and bacterial vaginosis (BV).

3.1.5 Gram staining

With the aid of swab sticks containing vaginal sample, smears were made on a grease free slides, air dried and were stained according to the recommended protocol for Gram staining. The stained smears were examined for the presence of *Lactobacillus specie*, *Gardnerella specie*, and clue cells using high power x100 objective oil immersion.

Inclusion criteria: All sexually active women age between 16-.45 years with symptoms suggestive of vaginitis

Exclusion criteria; women on their monthly menstruation and those who decline consent.

4. RESULTS

Out of the 200 High vaginal swab samples analyzed, 102 were positive for Bacterial vaginosis, which represent a prevalence of 51%. Table 1. The age range of the symptomatic women involved in the study was between 16- 45 years, with a mean age of 23.55 ± 6.171. The prevalence of Bacterial vaginosis in the study, were lower at both extreme of ages of the respondents while higher prevalence was concentrated around the mean ages. The highest age associated prevalence of 42.2. % was found in the 26-30 years age group representing the modal age group.

Most common symptoms identified was vaginal discharge (50%) followed by vaginal itching (23.5%), other identified symptoms include dysmenorrhoea, lower abdominal pain and dysuria at the following percentages 11.8%, 8.8%, 5.9% respectively (Table 3).

Table 4 showed the educational distributions among positive respondents. Majority of the respondents had secondary level of education which accounted for 81% of the total positive cases while those with primary and tertiary levels of education respectively had 8% and 9%.

Table 1. Nugent scoring system for bacteria vaginosis

Lactobacillus		Score	Gardnerella		Score	Mobiluncus		Score
4	+	0	4	+	4	4	+	2
3	+	1	3	+	3	3	+	2
2	+	2	2	+	2	2	+	1
1	+	3	1	+	1	1	+	1
0		4	0		0	0		0

0 – 3 "Gram stain score indicates normal bacterial vaginal flora.
4 – 6 "Gram stain score reveals altered vaginal flora that is not consistent with bacterial vaginosis".
7 – 10 "Gram stain score is consistent with bacterial vaginosis"

Table 2. Percentage prevalence of bacterial vaginosis in relation to different age group

Age (years)	Bacterial vaginosis	Percentage (%)
16-20	6	5.9
21-25	24	2.5
26-30	45	42.2
31-35	11	10.8
36-40	9	8.8
41-45	9	8.8
Total	102	100

Table 3. Educational status of participants in relation to age-group

Age	Primary	Secondary	Tertiary
16-20	1 (12.5)	6 (6.0)	0 (0.0)7
21- 25	2 (25.0)	20 (23.8)	2 (22.2)24
26-30	3 (37.5)	35 (41.7)	4 (44.4)42
31-35	0 (0.0)	9 (10.7)	2 (22.2)11
36-40	1 (12.5)	7 (8.3)	1 (11.1)9
41-45	1 (12.5)	8 (9.5)	0 (00)9
Total	8 (100.0)	85 (100.0)	9(100.)102

Table 4. Percentage prevalence of genitourinary signs and symptoms among participants

Signs and symptoms	Prevalence	Percentage (%)
Vaginal itching	24	23.5
Vaginal discharge	51	50
Dysmenorhea	12	11.8
Lower abdominal pain	9	88
Dysuria	6	5.9
Total	102	100.0

5. DISCUSSION

In the current study, the overall prevalence of bacterial vaginosis among symptomatic women of reproductive age was 51%,this finding is similar to that of Agarwa et al. [20] in Haryama, India, where prevalence of 48.5% was found in a similar study [20]. However, lower prevalences have been reported in some other part of the world such as Thailand in study done by Watcharotone et al. and also in Nigeria, a prevalences as low as 17.3% was reported among pregnant women in Northeastern Nigeria by Ibrahim et al [7] and 38% prevalence in South western Nigeria as well as 28.1% in Port Harcourt among women with tubal factor infertility. These variation in prevalence may due to the quality and clinical status of sampled population, as most of these studies focused on asymptomatic women while our study was among symptomatic women including pregnant women.

In the analysis of age related prevalence, this study found the highest rate among age group 26-30 years followed by 21--25 years and decreased prevalence at the extremes of ages of the respondents. This finding agrees with the report from a similar study done in Northern Rwanda by Muvunyi and Hernandez [21]. However, other studies such as one done by *Allsworth and Peipert* reported increasing prevalence of bacterial vaginosis with age of the respondents, [22]. The findings from our study may be due to the fact that our study was done in university environment which may have influenced the modal age range of the respondents hence, the age related prevalence.

The most common symptom found was vaginal discharge in 50% of the patients followed by vaginal itching with 23% and dysmenorrhoea 11.8%. It is worthy of note that none of these symptomatology can significantly be a sole diagnostic feature in vaginal infection. This also agreed with report of Muvunyi and Hernandez [21]. This could be due to the fact that vaginal discharge, itching and dysmenorhoea are most discomforting symptoms to most patients that often prompt them into seeking medical care.

All the patients recruited in this study had one form of education or the other, however the

majority (83%) had secondary school education. The finding differs significantly from that of Ibrahim et al. [7] in North eastern Nigeria were only 10% of the positive respondents had secondary level of education. This variation may be due to the fact that our study was done in the university environment and the majority of the respondents where university under graduates.

6. CONCLUSION

Bacterial vaginosis is a very common infection among sexually active females which usually presents as vulvovaginitis. Other similar conditions such as candidiasis and trichomoniasis are also known to cause vulvovaginitis but bacterial vaginosis is usually the most common. This knowledge will help to further build up index of suspicion of this disease condition which will   aids in accurate diagnosis and treatment.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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