

PREVALENCE OF BACTERIAL VAGINOSIS AMONG PATIENTS WITH VULVOVAGINITIS IN A TERTIARY HOSPITAL IN PORT HARCOURT, RIVERS STATE, NIGERIA.

Abstract.

Background: *Bacterial vaginosis* (BV), is one of the three common causes of Vulvovaginitis in most women of child bearing age. Majority of the patients have vaginal discharge and pruritus while others have dysmenorrhoea. There is no recent data on the prevalence of Bacterial vaginosis among women with Vulvovaginitis that have received treatment in one of the tertiary hospitals in the South-south zone of the country.

Aims: To determine the prevalence of bacterial vaginosis among women of child bearing age that attended various clinics in the hospital. To also relate the prevalence to age group and presenting complaints.

Methods: 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 consent. Questionnaires were used to obtain their ages, educational status and presenting symptoms.

Results: 102 of the patients had bacterial vaginosis with a prevalence of 51%. The commonest affected age group is between 26-30 years. The most common presenting symptom is vaginal discharge (50%). Majority of the patients were undergraduates and so had secondary education.

Conclusion: Bacterial vaginosis is the commonest cause of Vulvovaginitis and so any suspected case should be properly investigated before treatment.

22 **Key words:** Bacterial vaginosis, Vulvovaginitis, vaginal discharge, dysmenorrhoea.

23

24 **Introduction**

25 **Background information**

26 Bacterial vaginosis (BV) is a condition that results from the alteration in the normal microbiota
 27 and pH of the vagina following an overgrowth of certain bacteria¹. Bacteria vaginosis is the most
 28 common vaginal infection in women aged 15-44 years². It is common in sexually active women.
 29 The cause is not clearly known but certain risk factors have been associated to the development
 30 of Bacterial vaginosis. It has been associated with having multiple sex partners or frequently
 31 changing sex partner, recent antibiotic over use and the use of intrauterine devices. Others are
 32 douching, tub bathing or the use of intravaginal hygiene products³.

33 Various organisms have been implicated in the development of Bacterial vaginosis, some of
 34 which includes the normal flora of the vagina. Infected patients present with Mild to moderately
 35 increased abnormal vaginal discharge which may appear greyish white and adheres to the
 36 vaginal wall³. There may also be a strong fish- like odor, especially after sex. Other symptoms
 37 expected on the patients include pain, itching or burning sensation in the vagina. There can also
 38 be vulval irritation, dysuria or dyspareunia.^{3,4}

39 It is unknown how sexual activities contribute to the development of Bacterial vaginosis as there
 40 has been no report to determine whether treated or untreated sex partner will affect the
 41 transmission. However, Bacterial vaginosis was usually reported in 20 to 41% of patients in
 42 sexually transmitted clinics⁵ and Bacterial vaginosis can enhance the chances of contracting
 43 other sexually transmitted infections⁶. It is not gotten from toilet seats, beddings or swimming

pools. However, the causative bacteria of Bacterial vaginosis have been found in the rectum of 20–40 per cent of healthy women and this suggests that Bacterial vaginosis could also be due to autoinfection⁶. It 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 European and American studies. The prevalence in the United States is estimated to be 21.2 million (29.2%) 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, revealed a prevalence of 32.8%¹¹.

Although several studies on Bacterial vaginosis have been done in Nigeria, however, majority have their focus on pregnant women and only very few studied all symptomatic women which has led to the erroneous believe that all or almost abnormal vaginal discharge is due to Candida, even among physicians. This study aims at knowing the true burden of this disease condition in our environment with the purpose of creating more awareness and the use of 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. Bacterial vaginosis can be treated

effectively with antibiotics. The 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 Bacterial vaginosis being a common infection in women, there is no record of any research done about it in our hospital except 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.

Literature Review

Bacterial vaginosis is a vaginal disease condition thought to arise because of 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 cases³. 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 is mainly *Lactobacillus* specie, 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 involve 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, 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 for Bacterial vaginosis^{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 below^{2,15}:

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

The total score is interpreted and reported as follows;

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”.

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^{2,15}.

Treatment of Bacterial vaginosis before caesarean delivery, total abdominal hysterectomy or insertion of an intra uterine device is recommended. The treatment can be Metronidazole 0.75% gel daily for 5 days, Clindamycin 2% cream 5g 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 400mg 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 given¹².

Methodology

This is a descriptive cross sectional study involving women who presented to the Medical Microbiology laboratory for high vaginal swab test with clinical details or diagnosis suggestive of Vulvovaginitis that were recruited concurrently until a sample size of 200 including 20% attrition was achieved. The sample size was calculated using formulae $N = Z^2 p(1-p)/d^2$ by Araoye¹⁶, based on prevalence of 28.1% reported among women with tubal factor infertility in Nigeria¹⁷. High vaginal swab was collected from each of the patients with the aid of sterile speculum, according to the standard protocol¹⁸, after the procedure was explained and verbal consent obtained from each participating patient. Samples obtained were immediately sent for analysis which included whiff test, pH determination and gram staining. Basic demographic information which included; age, educational level, and presenting symptoms were obtained from the questionnaire 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 cases¹⁵.

152 **Laboratory procedures**

153 **Whiff tests**

154 A portion of the undiluted vaginal discharge from the swab was placed on the surface of a clean
155 glass slide. Then one drop of 10% KOH was added directly to the vaginal sample on the slide.
156 The slide was held and the vapour layer (whiff) above the surface of the slide was gently fan
157 and was assessed for the presence of volatile amines which have a fishy odor.

158 **Results**

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

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

161

162 **pH DETERMINATION:**

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

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

169 **Gram staining;** With the stick, smears were made on a grease free slide, was air dried and the
170 gram staining was done according to the recommended protocol .The stained smear was view
171 with high power x100 objective oil immersion, examined for the presence of *Lactobacillus*
172 *specie*, *Gardnerella specie*, and clue cells.

Findings; Gram variable coco bacilli or short rods were regarded as *Gardnerella vaginalis*, large squamous epithelial cells with gram-positive, gram-variable bacilli and coccobacilli clustered on the edges were regarded as clues cells.

The presence of clue cells, *Gardnerella vaginalis*, elevated pH and positive whiff test were regarded as positive for bacteria vaginosis.

All those who came from the various clinics with Vulvovaginitis, that were sexually active, aged between 16-45 years and who consented to be part of the study were included. All those who did not consent to being part of the study or who were on their monthly menstruation were excluded.

Result

Out of the 200 High vaginal swab samples analyzed, 102 were positive for Bacterial vaginosis, which represent a prevalence of 51%. Table1. 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 26-30years 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 2).

Table 3 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%.

196

197 Table one: Age with percentage prevalence.

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

198

199

200 Table two: Educational status with Age.

A g e	Primary	Secondary	Tertiary
1 6 - 2 0	1 (12.5)	6 (6 . 0)	0 (0.0)
2 1 - 2 5	2 (25.0)	2 0 (2 3 . 8)	2 (22.2)
2 6 - 3 0	3 (37.5)	3 5 (4 1 . 7)	4 (44.4)
3 1 - 3 5	0 (0.0)	9 (1 0 . 7)	2 (22.2)
3 6 - 4 0	1 (12.5)	7 (8 . 3)	1 (11.1)
4 1 - 4 5	1 (12.5)	8 (9 . 5)	0 (0 0)
T o t a l	8 (100.0)	8 5 (100.0)	9(100.)

201

202 Table three: Genitourinary signs and symptoms

Signs and symptoms	Prevalence	Percentage (%)
Vaginal itching	24	23.5
Vaginal discharge	51	50
Dysmenorrhea	12	11.8
Lower abdominal pain	9	8.8
Dysuria	6	5.9
T o t a l	102	100.0

205 Discussion

206 In the current study, the overall prevalence of Bacterial vaginosis among symptomatic women of
 207 reproductive age was 51%. The study finding is similar to the finding of Agarwa et al in
 208 Haryana, India, where prevalence of 48.5% was found in a similar study¹⁹. This further
 209 buttressed the assertion that Bacterial vaginosis is the most common cause of Vulvovaginal
 210 symptoms among women of childbearing age, accounting for 40 to 50 percent of cases³.
 211 However, lower prevalence has been reported in some other part of the world by Watcharotone
 212 et al in Thailand and also in Nigeria, 17.3% prevalence of Bacterial vaginosis among pregnant
 213 women in Northeastern Nigeria was reported by Ibrahim et al ⁷ and 38% prevalence in South
 214 western Nigeria as well as in Port Harcourt where 28.1% was reported among women with tubal
 215 factor infertility. These variation in prevalence may due to the 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--25years and decreased prevalence at the extremes of ages of the respondents. This was similar to the finding of (*Muvunyi and Hernandez*) in Rwanda²⁰.

However, other studies such as one done by *Allsworth and Peipert* reported increasing prevalence of Bacterial vaginosis with age of the respondents²¹. The findings from our study may be due to the fact that the majority of the respondents were within the age 21-30 years; hence the high prevalence in the age group and also the study was done in university environment where most of the respondents were under graduates within this age bracket.

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 finding was in similarity with what was reported in a similar study in southern Rwanda²⁰. This could be due to the fact that vaginal discharge, itching and dysmenorrhoea 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. Majority of them, (83%) had secondary school education. The finding differs significantly from that of Ibrahim et al⁷ in North eastern Nigeria where 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 were university under graduates.

239 **Summary**

240 Bacterial vaginosis is a very common infection among sexually active females. It usually
 241 presents as Vulvovaginitis. The other conditions causing Vulvovaginitis such as Candidiasis and
 242 Trichomoniasis may also be the cause of the Vulvovaginitis but Bacterial vaginosis is usually
 243 commoner than this other two. Adequate attention should be given to a suspected case so that
 244 accurate diagnosis and appropriate treatment are given to the patients involve.

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