



## Prevalence and Risk Factors of Bacterial Vaginosis in a Cohort of Women Seeking Child Spacing Services in Nigeria

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**Key words:** Bacterial vaginosis, fertility regulation, Nigeria, reproductive, prospective

**Abstract:** The sustenance of reproductive potential of patients seeking contraceptive options is essential. Bacterial vaginosis prevalence risk is increased by the choice of contraceptive options which may affect post contraception fertility. To determine the prevalence and risk factors of bacterial vaginosis in a cohort of women seeking child spacing services. A cross-sectional prospective study of women seeking fertility regulation services was conducted in a tertiary health facility in Nigeria between March and September 2014. Interviews were conducted to collect data on sociodemographic characteristics, characteristics of vaginal discharge and sexual practices engaged by these women. Bacterial vaginosis was diagnosed using the Amsel criteria. Odds Ratios (ORs) with 95% Confidence Intervals (CIs) were calculated to assess the predisposing factors. About 178 clients were recruited. Bacterial vaginosis was noted in 7.87% of these women. Patients had increased risk of bacterial vaginosis when they were of low socioeconomic class (OR 8.17; 95% CI 2.30-29.81), used vaginal drying agents (OR 9.70; 95% CI 2.35-46.15) had an early sexual debut (OR 9.56; 95% CI 2.54-38.92), a history of previous sexually transmitted infections (OR 21.39; 95% CI 4.99-105.30) and practiced vaginal douching (OR 19.23; 95% CI 3.82-130.43).

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### INTRODUCTION

Bacterial vaginosis is the commonest vaginal syndrome affecting premenopausal and pregnant women with an incidence of 20-50%<sup>[1]</sup>. About half of women with bacterial vaginosis may go through their reproductive career without manifestation of the symptoms of the disease<sup>[2,3]</sup>. The female reproductive system has a natural mechanism of protecting itself by maintaining a specific

ratio of lactobacilli flora, guarding against the pathogenic strains of bacteria and ensuring a sustainable reproductive career<sup>[4,5]</sup>. The number of lactobacilli in the vagina is largely determined by hormonal, environmental factors and sociocultural practices. The alteration of the normal vaginal milieu results in the distortion of the delicate balance of the vagina by organisms such as *Gardnerella vaginalis*, *Mobiluncus curtisii*, clostridia, mycoplasma hominis, anaerobic gram negative rods and

*Peptostreptococcus* species. The ten<sup>[6, 7]</sup> the presence of such organisms also cause alteration of the vagina pH >4.5, creating a creamish vaginal discharge with characteristic fishy smell and presence of “clue cells” on microscopic examination of discharge. These stated conditions constitute the Amstel diagnostic criteria for bacterial vaginosis<sup>[8]</sup>.

Certain factors had been implicated in the aetiology of bacterial vaginosis and the influence of sociocultural practices such as vaginal douching, use of vaginal tightening agents among other risk factors had been highlighted in various reviews<sup>[9, 10]</sup>. Its’ association with tubal infertility, miscarriages, preterm rupture of fetal membrane, chorioamnionitis, postpartum endometritis and the development postoperative cuff infections during gynaecological procedures is also well documented<sup>[11-13]</sup>.

A woman’s ability to reproduce, most instances, reduces the surveillance on factors affecting future fertility and negative reproductive outcome. The family planning clinic provides fertility regulation services for the purpose of child spacing. Thus, having knowledge of the presence of bacterial vaginosis in patients who still want to reproduce and treating them will go a long way in avoiding the long-term sequelae of infertility which is associated with bacterial vaginosis. Certain family planning methods have been associated with increased risk of bacterial vaginosis such as the intrauterine contraceptive device<sup>[14]</sup> while hormonal and condom have a reverse predisposition to its occurrence<sup>[15, 16]</sup>.

It is on the bases of the above, we seek to know the prevalence of bacterial vaginosis which may be associated with adverse outcome in a perceived population of healthy women who would still desire future child bearing.

## **MATERIALS AND METHODS**

A cross-sectional prospective study was carried out at the University of Port Harcourt Teaching Hospital, Nigeria, between March 3 and September 30, 2014. All consecutive women who presented for fertility regulation for child spacing at the family planning clinic of the hospital were recruited. Women who presented for fertility limitation who had metronidazole or clindamycin for a disease condition other than bacterial vaginosis within the previous 90 days, irrespective of the route of administration or had experienced vaginal bleeding were excluded from the study.

Informed consent was obtained from all clients recruited and ethics clearance for the study was obtained from the ethics review committee of the hospital. Each client was interviewed using a pre-structured questionnaire that was completed by the interviewers; information about age, tribe, occupation, level of

education, husband’s occupation and parity were obtained. The social class of the patient was determined as proposed by Olusanya *et al.*<sup>[17]</sup>. Other collected information included the history of abnormal vaginal discharge, practice of vaginal douching, use of vaginal tightening or drying products and age of sexual debut. The number of lifetime sexual partners, history of Sexually Transmitted Infections (STIs) and history of smoking were also ascertained.

Following the interview, each participant had a vaginal sample collected in the presence of a chaperon. Samples were collected with the aid of a wooden spatula from the vaginal walls and the posterior vaginal fornix.

The vaginal discharge or secretion was then assessed on the basis of the damsel criteria. Visual inspection of the discharge looking for characteristics of bacterial vaginosis (homogenous and creamy) was done. The vaginal fluid pH was determined by adding 1 mL of normal saline to the collected vaginal secretion in a sterile test tube with a vaginal fluid pH of >4.5 suggestive of bacterial vaginosis. Thereafter, a drop of the solution was placed on a clean glass slide and one drop of 10% potassium hydroxide in aqueous solution was added. The emission of a fishy odor (“whiff test”) if present, is strongly suggestive of bacterial vaginosis. The presence of at least two out of three assessed criteria will warrant a microscopic examination of the prepared slide looking out for “clue cells.” Confirmation of the diagnosis of bacterial vaginosis was made if >20% of the epithelial cells had adherent bacteria.

The sample size was determined using a formula proposed by Leshe-Kish for single proportions<sup>[18]</sup> and using a 9.8% bacterial vaginosis prevalence of women attending family planning clinics<sup>[19]</sup>. The minimum sample size for this study was 136 clients but allowing an attribution of about 20%, a total of 178 clients were recruited.

The data were analyzed using SPSS Version 15.0 (IBM, NY, USA) and Epi Info Version 7.0 (Centers for Disease Control and Prevention, Atlanta, GA, USA). Frequency tables were generated with results tested for significance using the student t-test and the  $\chi^2$ -test. The  $p < 0.05$  was considered statistically significant. An assessment of the risk factors for bacterial vaginosis among clients presenting for child spacing services was estimated by calculating Odds Ratios (ORs) with 95% Confidence Intervals (CIs).

## **RESULTS AND DISCUSSION**

A total of 178 women fertile women seeking fertility regulation services in the family planning clinic of the Teaching Hospital were recruited. Bacterial vaginosis was recorded among 14 (7.87%) of these women.

Table 1 shows sociodemographic characteristics of the women. The mean age of the women was 26±5 years with a range of 18-36. Twelve (85.7%) out of the 14 women with bacterial vaginosis were of low socioeconomic class. This was statistically significant. (p = 0.0000444, OR 8.17; 95% CI 2.30-29.81).

Table 2 shows the analysis of risk factors for bacterial vaginosis. In this population, a young age at sexual debut and a history of STIs were also both significantly associated with bacterial vaginosis (p = 0.0001612 and p = 0.0000010 each). Having had only one sexual partner was a protective factor, reducing the likelihood of bacterial vaginosis (p = 0.0000003). Smoking was not found to be associated with bacterial vaginosis in this population. Vaginal douching and use of vaginal tightening and drying products were significantly associated with bacterial vaginosis among these women (p<0.00000061 and p<0.0002221, respectively).

Table 1: Social demographic characteristics of clients

Variables	BV	No. BV
<b>Age</b>		
<20	1(7.1)	5(3.0)
20-24	1(7.1)	19(11.6)
25-29	5(35.7)	61(37.2)
30-34	4(28.6)	56(34.1)
>35	3(21.5)	23(14)
<b>Educational status</b>		
None	0	0
Primary	9(64.3)	31(18.9)
Secondary	3(21.3)	84(51.2)
Tertiary	2(14.3)	49(25.6)
<b>Social class</b>		
Low (4, 5)	8(57.1)	23(14.0)
Middle (3)	4(28.6)	99(60.4)
High (3)	2(14.3)	42(25.6)

Patients of low socioeconomic class are at higher risk of developing BV when compared to higher social class  $\chi^2 = 16.67$  p = 0.0000444, OR = 8.17; 95% CI 2.30-29.81)

In the present study, the prevalence of bacterial vaginosis among women seeking fertility regulation services was 7.8%. This value is relatively lower than the prevalence observed in the similar study population in Thailand where more than half of those diagnosed were asymptomatic<sup>[20]</sup>. The variation may be linked to the fact that study population was confined to those seeking family planning services for child spacing as against terminal contraception. This study however did not evaluate the symptomatology of the patients but is worthy of note that proper vigilance is necessary to identify patients with this condition, so that, the patients condition are not aggravated by choice of contraceptives. The significance of bacterial vaginosis in the population under discussion is buttressed by findings by Lassey *et al.*<sup>[14]</sup> who also noted bacterial vaginosis as the commonest genital tract infection in women seeking contraceptive services in Ghana.

The association of low socioeconomic class to the development of bacterial vaginosis was highlighted in this study where an eight fold increase in the risk among the women studied was observed. This observation was corroborated by finding by other investigators<sup>[21, 22]</sup>. Persons of lower socioeconomic class have been associated with poor health seeking, leaving untreated observed disease conditions because of economic limitations and high risk sexual behaviour which increases the risk of bacterial vaginosis which is a sexually related disease condition<sup>[23]</sup>.

Introduction of any substance into the vagina as evident by the practice of vaginal douching and use of drying agents are associated with change in the vagina milieu. Interior, increasing the alkalinity of the vagina and reducing the lactobacilli population. Among sexually active females in our environment, this practice is

Table 2: Risk factors for bacterial vaginosis in women seeking child spacing services

Variables	BV	No. BV	p-values	OR (95% CI)
<b>Vaginal douching</b>			0.0000061	19.23(3.82-130.43)
Yes	12(85.7)	39(23.8)		
No	2(14.3)	125(76.2)		
<b>Use of vaginal tightening and drying agents</b>			0.0002221	9.70(2.35-46.15)
Yes	11(78.6)	45(27.4)		
No	3(21.4)	119(72.6)		
<b>Smoking</b>			0.511	1.27(0.00-6.75)
Yes	2(14.3)	19(11.6)		
No	12(85.7)	145(88.4)		
<b>Age at sexual debut</b>			0.0001612	9.56(2.54-38.92)
≤15	10(71.4)	34(20.7)		
>15	4(28.6)	130(79.3)		
<b>No of lifetime sexual partners</b>			0.0000003	0.04(0.01-0.18)
1	2(14.3)	135(82.3)		
≥2	12(85.7)	29(17.7)		
<b>History of sexually transmitted infection</b>			0.0000010	21.39(4.99-105.30)
Yes	11(78.6)	24(14.6)		
No	3(21.4)	140(85.4)		

BV= Bacterial Vaginosis; No BV = No Bacterial Vaginosis

supposed to increase sexual satisfaction of the male by encouraging vagina dryness with a false sense of tightness mimicking a virgin's vagina<sup>[24]</sup>. This study identified strong association between these practices and bacterial vaginosis among the women which is in keeping with previous studies<sup>[25, 26]</sup>. Keeping in view, the reason for the presentation of the patients at the family planning clinics, the choice of any contraceptive method that will worsen the incidence of bacterial vaginosis should be avoided in the selection of contraceptive options. The use of intrauterine contraceptive as an option in this group of patients was associated with an increased risk of bacterial vaginosis by Do Logo *et al.*<sup>[27]</sup> and Harikarnpukdee *et al.*<sup>[28]</sup>.

During the period of adolescence, reproductive hormones and genital tract anatomy increase the susceptibility of infections. This survey identified an increased risk of bacterial vaginosis in women who had sexual exposure before the age of 15 years. At this age, the cylindrical epithelium are ectopic and are at greater risk of been affected by pathogenic organisms<sup>[29]</sup>. In addition to the above, patients in this age group are less likely to use condom during sexual exposure which had been associated with reduced risk of contacting bacterial vaginosis. Hence, condom use should be advised in women at this age to reduce the risk of bacteria vaginosis.

The relationship between sexual intercourse and bacterial vaginosis was further buttressed in this study, which noted that having one sexual partner is protective as against the having more than one. The involvement with more than one sexual partner indirectly is related to having increased frequency of intercourse and also the risk of sexually transmitted or enhanced infections which was also observed in the population studied with bacterial vaginosis. Patients with these attributes seeking contraceptive options should be screened for bacterial vaginosis while at the same should be offered contraceptive options not likely to increase bacterial vaginosis risk.

Varying opinions exist in the contribution of smoking to bacterial vaginosis with some in firm support of the positive link<sup>[30, 31]</sup>. Nicotine has been associated with reduced phagocytic properties and has antiestrogenic properties, which reduces the lactobacilli population. Nevertheless others reason that the smoking itself is confounder to other high-risk sexual behaviours which in turn increase the risk of bacterial vaginosis. These propositions were not supported by the findings in this study which showed no association between bacterial vaginosis and smoking. This may be so because of the cultural background which discourages smoking among the population. This may suggest that smoking is not a single significant factor that other co-factors must exist to facilitate the occurrence of bacterial vaginosis.

This study limited itself to identifying the prevalence of bacterial vaginosis among the subjects of interest; there may be need to further look into the prevalence of bacterial vaginosis among users of the various contraceptive options in a later survey. Nevertheless, bearing in mind that women seeking child spacing services would need to maintain their reproductive potentials, it is imperative that reproductive limiting factors should be avoided.

Identifying patients with the risk of bacterial vaginosis, treating them and avoiding contraceptive options that may likely aggravate the condition will go along way in maintaining the post contraceptive fertility of the patients. This will also assist in reducing the socioeconomic burden of preterm births and associated complications to the health system.

## CONCLUSION

The prevalence of bacterial vaginosis in this cohort raises the need for a high index of clinical suspicion in patients seeking fertility regulation services in the presence of notable risk factors. Avoidance of contraceptive methods that may increase risk of bacterial vaginosis and the need for treatment to maintain reproductive potentials is advised.

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