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Prevalence and Risk Factors for Bacterial Vaginosis Among Antenatal Attendees in A Teaching Hospital in Southern Nigeria

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ABSTRACT

Background: Bacterial vaginosis is one of the most common genital tract infections among women of reproductive age. Though frequently asymptomatic it has been strongly associated with poor pregnancy outcomes such as preterm delivery, low birth weight, premature rupture of membranes, late miscarriage and postpartum endometritis. ***Objective:*** To determine the prevalence of bacterial vaginosis and its risk factors among pregnant women obtaining antenatal care at the University of Uyo Teaching Hospital, Uyo, Nigeria. **Methodology**: This is a descriptive cross-sectional study of two hundred and sixty-one pregnant women, with or without symptoms suggestive of bacterial vaginosis. Information on socio-demographic, obstetric and gynaecological risk factors were obtained from consenting participants. A swab sample was obtained from the posterior fornix of the vagina of each client and immediately smeared on a labelled slide and analysed and bacterial vaginosis was diagnosed using the Nugent scoring system. **Results:** The prevalence of bacterial vaginosis was 15.2%. Those who had vaginal discharge had a slightly higher prevalence of 17.1% while those without vaginal discharge had a prevalence of 14.4%. The non-utilization of hormonal contraceptives prior to pregnancy, non-use of condoms and increase in lifetime sexual partners were associated with a non-statistically significant increase in the prevalence of bacterial vaginosis. However, there was a statistically significant association (P= 0.017) between occupation of groups of participants and occurrence of bacterial vaginosis with traders being the least likely to develop it. **Conclusion:** Although bacterial vaginosis occurs more in women with vaginal discharge, its prevalence is also comparatively high in those without vaginal discharge. It

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might therefore be needful to incorporate routine screening for bacterial vaginosis for all pregnant women and treatment of those who are positive as part of our obstetric services in the antenatal clinic in order to prevent the sequelae of the infection.

Keywords: Bacterial vaginosis, pregnancy, risk factors, Southern Nigeria, Uyo

Introduction

Bacterial vaginosis (BV) is a polymicrobial, superficial vaginal infection involving a reduction in the amount of lactic acid and hydrogen-peroxide-producing Lactobacillus and an over-growth of anaerobic and gram-negative or gram-variable bacteria.[1] These anaerobes include Gadnerella vaginalis, Prevotella, Bacteroides and Mobiluncus species. Other bacteria implicated include Mycoplasma and Ureaplasma species.[2]

It is one of the most frequent conditions encountered in sexually transmitted diseases (STD), genitourinary medicine or other reproductive health clinics throughout the world 2-3. Various studies have reported the prevalence of BV among non-pregnant women to range from 15%-30% and even up to 50% of pregnant women have also been reported to have BV in certain populations.[4-5] However, the majority of cases of BV are asymptomatic and remain unreported and untreated.[4-6]

Bacterial vaginosis is an important gynaecological problem of women of child bearing age worldwide. It has consistently been shown to be a risk factor for adverse obstetric outcomes such as preterm labour and delivery, preterm premature rupture of membranes (PPROMs), spontaneous abortion, and postpartum infections such as endometritis and caesarean section wound infections.[6-7]

Bacterial vaginosis also increases the risk of human immunodeficiency virus (HIV) acquisition by approximately 60%; because it increases HIV genital shedding in vaginal discharge and results in increased concentration of HIV in genital secretions, which in turn facilitates both vertical and sexual HIV transmission.[8-9]

The standards for the diagnosis of BV are the Nugent criteria, 10 although in clinical practice, the Amsel criteria is still very relevant for diagnosis.[11] The Nugent Criteria has been shown to have a higher sensitivity and specificity when compared with the Amsel criteria (89% and 83%, respectively.[12]

This method also has several other advantages that include; creating a permanent record that can be subsequently reviewed to confirm the diagnosis of BV and assess the reliability of the reading, reporting intermediate stages of BV which is particularly useful in longitudinal studies, examining serial vaginal fluid samples for changes in BV status, quantifying the amount of the three individual organisms as well as enabling assessment of the organism-specific risk of disease.[11]

Much information is known regarding the microbiology and identification of BV, however, limited information exists concerning the factors or behaviors that increase a woman's risk for BV during pregnancy. The current predictors of BV have been limited to race, sexual activity, socio-economic status, and perhaps vaginal douching.[13-14]

Most of the epidemiologic studies conducted to date to determine risk factors for BV have concentrated on symptomatic cases and included results from women seeking care in STD clinics or inner-city obstetric offices.[15]

The generalizability of current literature is unclear since asymptomatic cases have not been examined fully and current data represents only a subset of women of reproductive age. Therefore, this study will help bridge this gap in knowledge as both asymptomatic and symptomatic pregnant women are included in the study.

There are very few studies in Nigeria that focus on this subject and there is none of such in the study area. Therefore, this study sets out to determine the

prevalence and risk factors of BV among pregnant women obtaining antenatal care (ANC) in the University of Uyo, Teaching Hospital, (UUTH) Uyo, Akwa Ibom State, South-South geopolitical region of Nigeria.

Methodology

- **Study Design:**
  A descriptive cross-sectional study design was used to determine the prevalence and risk factors of BV among pregnant women attending antenatal clinic at the UUTH, Uyo.

- **Background/Location of the Study**
  The University of Uyo Teaching hospital (UUTH), Uyo is a 500-bed tertiary healthcare facility and receives referrals from peripheral healthcare facilities in Akwa Ibom State with a population of over 5.7 million people. UUTH was established in 1996 as a state specialist hospital, but was later transformed to a Federal Medical Centre (FMC), in 1997. It was later upgraded to a Teaching Hospital in February, 2007 by the Federal Government of Nigeria.

- **Target Population**
  All pregnant women presenting at UUTH for ANC irrespective of gestational age were assessed for eligibility to participate in the study.

- **Sample Size Determination**
  The BV prevalence of 17% 16 from a study at Nnewi, Anambra state, South East, Nigeria with similar socio-economic characteristics as Uyo was chosen to calculate the sample size. The minimum sample size was calculated assuming a 95% confidence level using the Fisher's formula

  $$\frac{N = Z^2pq}{D^2}$$

  Where N = sample size
  Z = standard normal deviate, (1.96)
  P = prevalence of BV in a study at Nnewi[16] = 17% = 0.17
  q = 1-p
  D = degree of freedom = 0.05
  $N = (1.96)^{17} \times 0.17 \times (1-0.17)/(0.05)^{17}$
  N = 217

Twenty percent (20%) of this number equaling 44 was added for non-response. Total minimum sample size was 217 +44 = 261. Two hundred and Sixty-One participants were therefore recruited into the study.

- **Study Duration:** The study lasted from July to September 2017

- **Sampling Technique:**
An average of 50 clients book for ANC every Wednesday in the hospital. Pregnant women usually write their names on a sheet of paper on arrival at the clinic during their booking visits. This was used to form the estimated sampling frame for the duration of study. The total population expected to register for ANC during the period under study was approximately 600 (ie 50 x 12 weeks). The desired sample size was 261. The systematic sampling technique was used to recruit consenting participants into the study. Every kth number from the sample frame was selected every week on Wednesdays during the booking clinic, and during the antenatal clinic visits, where "K" is the sampling interval and is given by

  $$K = \frac{N}{n}$$

  N = total population
  n = proposed sample size
  $K = \frac{600}{261} = 2.3$

  Sampling interval is therefore approximated to 2.

  The starting number was selected by simple random technique by balloting method and every 2nd participant was recruited into the study until the minimum sample size was obtained.

Selection Criteria

- **Eligibility**
  Pregnant women attending the antenatal clinic of the hospital after booking from the time of onset of the study.

- **Exclusion**
  Any pregnant woman who withheld consent to participate in the study, all pregnant women on antibiotics treatment two weeks prior to commencement of the study, pregnant women with ruptured fetal membranes, any pregnant woman with vaginal bleeding, HIV positive women and pregnant women who started receiving care prior to commencement of the study.

Study Procedure

Following proper counseling and thorough explanation of the test to be performed as well as assurance regarding confidentiality of information obtained from each participant, a structured pretested interviewer-administered questionnaire containing information on socio-demographic and obstetric history was administered by trained research assistants to all consenting pregnant women who were eligible for the study. Information obtained included age, ethnicity, religion, marital status, educational status, occupation, parity and gestational age, previous preterm deliveries, presence of vaginal discharge and vulval pruritus. Others included presence of dysuria, smoking, douching, use of intrauterine contraceptive device and hormonal contraceptives prior to pregnancy, age at coital debut, use of condom by husband and number of lifetime sexual partners.

The questionnaires were completed in a confidential manner in the antenatal and booking clinics. Participants were then placed in the dorsal position and an appropriately sized sterile Cusco's speculum was gently inserted into the vagina to expose the cervical os. A swab was obtained from the posterior fornix of the vagina and immediately smeared on a labeled slide and allowed to air-dry. The slides were then transported to the Medical Microbiology laboratory of UUTH for preparation according to standard procedures.

Diagnosis of Bacterial Vaginosis by Nugent Scoring System

A score of 0-10 was generated from combining three other scores. The scores were as follows:

Table 1[a]

Nugent Scores	Interpretation
03	Negative
46	Intermediate
7-10	Positive

At least 1020 high power (100 × oil immersions) fields were counted and an average determined.

Table 1[b]

Lactobacillus morphotypes-average per high powered (100×oil immersion) field. View multiple fields. -Score 0 for >30 -Score 1 for 15-30 -Score 2 for 14 -Score 3 for <1 -Score 4 for 0	Gardnerella/Bacteroides morphotypes-average per high powered (100× oil immersion) field. View multiple fields. -Score 0 for 0 -Score 1 for <1 -Score 2 for 14 -Score 3 for 530 -Score 4 for >30	Curved Gram variable rods-average per high powered (100× oil immersion) field. View multiple fields -Score 0 for 0 -Score 1 for <5 -Score 2 for 5+

Data Management

Data collected for the study were collated, and analysed using SPSS version 20. Categorical data were summarized in frequencies and percentages. Quantitative data were summarized using appropriate measures of central tendencies and dispersion. Comparison between variables was done using Chi square at a significant level of $P < 0.05$. Logistic regression was employed to predict the risk factors for BV in the study.

Ethical Consideration

Approval to conduct the study was sought and obtained from the UUTH Research and Ethical Review Committee. Detailed explanation of the study was given to the participants and participation in the study was voluntary. Information obtained from participants was kept strictly confidential and a written informed consent was obtained from all of them prior to commencement of the study.

Results

Of the 261 participants, 256 (98.1%) had complete data for assessment of BV according to the Nugent criteria. Thirty-nine of the 256 pregnant women with or without symptoms were positive for BV giving a prevalence of 15.2%, two hundred and ten (82.0%) were negative while seven (2.7%) were intermediate. The prevalence of BV among those who had vaginal discharge was 17.1% while those without vaginal discharge had a prevalence of 14.4%. There was no statistically significant difference between participants who had vaginal discharge and BV 13(17.1%) and those who had BV but did not have vaginal discharge 26 (14.4%) X 2 = 0.2931; P= 0.588.

Table 2 shows a description of the study population: the majority 220 (85.9%) were less than 35 years, most of them 205 (80.1%) were indigenes and almost all 255 (99.6%) had secondary and post- secondary level of education and were married. A greater proportion 84 (32.8%) were civil servants/professionals and 146 (57%) were in their third trimester. Almost all the participant 251 (98%) were of low parity.

Table 3 shows the risk and protective factors for BV among participants with vaginal douching being the commonest risk factor and the mean age at first sexual exposure and average number of lifetime sexual partners being 20.2 years and approximately 3.0 respectively. While 44.5% had used condoms only 23.4% of participants had used hormonal contraceptives prior to pregnancy.

Respondents who had BV initiated sex at an earlier age (19.95 years versus 20.29 years) though the difference was not statistically significant (p= 0.590). Also, respondents who had BV had averagely more lifetime partners (2.42) when compared to those who were negative (2.64) though the difference was statistically insignificant (p = 0.328).

Prevalence of BV was lowest among traders (4.9%), and highest among Artisans/hairdressers/ seamstresses (26.9%) p=0.004 (Table 4).

The distribution of gestational age as shown in Table 5 indicates a decline in the prevalence of BV after the first trimester being 40.0% in the first trimester and 15.8% in the third trimester. The difference was statistically significant (P=0.019). Thirty-five (89.7%) of the thirty-nine participants who had BV had never used hormonal contraceptive prior to pregnancy while among those who had used it only 10.5% were positive for BV. This also was statistically significant (P=0.039). All respondents who were positive for BV were of low parity (0-4) and there was no association between use of IUCD prior to pregnancy and development of BV.

Table 6 shows the use of multivariate logistic regression to predict BV among participants. Traders were 79.0% at less risk of having BV when compared to other occupational groups (P=0.017; 95%CI=0.0600.759). Also respondents in their 2nd and 3rd trimesters were 85.0% (P=0.006; 95% CI=0.0380-0.5727) and 76.0% (P=0.026; 95%CI=0.06910.845) respectively at less risk of having BV when compared to participants in their 1st trimester. Participants who did not use hormonal contraceptives prior to pregnancy were 3 times more at risk of having BV while those who reported non use of condoms were 1.8 times at risk

of having BV. For every one increase in number of lifetime sexual partners, there was a 1.1 higher chance of having BV among participants. The last three findings were however not statistically significant.

Table 2: Socio-demographic and obstetric characteristics of respondents (n=256)

Characteristics	Frequency	Percentage (%)
Age Group		
Less than 35 years	220	85.9
35 and above	36	14.1
Ethnic Groups		
Indigenes	205	80.1
Non Indigenes	51	19.9
Educational level		
No formal/Primary education	1	0.4
Secondary and Post-secondaryo	255	99.6
Occupational Group		
Unemployed/students	64	25.0
Civil/public servants/professionals	84	32.8
Artisans/hairdressers/seamstress	26	10.2
Traders	82	32.0
Religion		
Christian	252	98.4
Muslim	4	1.6
Marital Status		
Single	1	0.4
Married	255	99.6
Gestational Age (in weeks)		
1-13 weeks	15	5.9
14-26	95	37.1
27-42	146	57.0
Parity Group		
1-4	251	98.0
5 and above	5	2.0

The majority 220 (85.9%) were less than 35 years. Most 205 (80.1%) were indigenes. Almost all 255 (99.6%) had secondary and post-secondary level of education and were married. A greater proportion 84 (32.8%) were civil servants/ professionals.

Table 3: Self-Reported Risk and protective factors for Bacterial Vaginosis among Respondents

	Frequency (%)	Percentage (%)
Risk Factors		
Vaginal douching	94 (36.7)	
Smoking	7 (2.7)	
Use of IUCD prior to pregnancy	5 (2.0)	
Age of First sexual exposure (mean)		20.24+ 3.64
Number of lifetime sexual partners (mean)		2.46+ 1.27
Protective Factors		
Condom use	114	44.5
Use of hormonal contraceptives before pregnancy	60	23.4

The commonest risk factor among the respondents was the practice of vaginal douching 94 (36.7%). Only 7 (2.7%) and 5 (2.0%) smoked cigarettes and had used IUCD respectively before the index pregnancy. The mean age at first sexual exposure and average number of lifetime sexual partners were 20.24 years and approximately 3 respectively. The most common protective factor was condom use (44.5%)

Table 4: Association between Socio-demographic Factors and Bacterial Vaginosis status of Respondents

Characteristics	Bacterial Vaginosis Status		Total	Statistical Test and Values
	Negative	Positive		
Age group (years)				
Less than 35	188(85.5)	32 (14.5)	220	X^2= 0.575
35 and above	29 (80.6)	7 (19.4)	36	P=0.455
				DF =1
Tribe				
Indigenes	171(83.4)	34(16.6)	205	X^2= 1.454
Non Indigenes	46 (90.2)	5 (9.8)	51	P=0.281
				DF =1
Education				
No formal/Primary	1 (100.0)	0 (0.0)	1	X^2= 0.180
Secondary/post secondary	216 (84.7)	39 (15.2)	255	P=0.999*
				DF =1

Occupation				
Unemployed/students	53 (82.8)	11 (17.2)	64	X^2= 11.379
Civil/public servants/professionals	67 (79.8)	17 (20.2)	84	P=0.004F**
Artisans/hairdressers/seamstress	19 (73.1)	7 (26.9)	26	DF =3
Traders	78 (95.1)	4 (4.9)	82	
Religion				
Christian	214(84.9%)	38 (15.1)	252	X^2= 0.300
Muslims	3 (75.0)	1 (25.0)	4	P=0.486F*
				DF =1
Marital Status				
Single	1(100.0)	0(0.0)	1	X^2= 0.180
Married	216 (84.7)	39 (15.3)	255	P=0.999
				DF =1
Smoking Status				
Yes	6 (85.7)	1 (14.30)	7	X^2= 0.005
No	211 (84.7)	38 (15.3)	249	P=0.999
				DF =1

There is a statistically significant association between occupational groups of respondents and occurrence of BV (p=0.004).

Table 5: Association between Obstetric and Gynaecologic Factors and BV Status of Respondents

Characteristics	Bacterial Vaginosis Status		Total	Statistical Test and Values
	Negative	Positive		
Prior Use of hormonal contraceptives				
Yes	56 (93.3)	4 (6.7)	60	X^2= 5.455
No	161 (82.1)	35 (17.9)	196	P=0.039F**
				DF =1
Use of condoms				
Yes	101 (88.6)	13 (11.4)	114	X^2= 2.336
No	116 (81.7)	26 (18.3)	142	P=0.161
				DF =1

Use of IUCD prior to pregnancy				
Yes	5 (100.0)	0 (0.0)	5	X^2= 0.917
No	212 (84.5)	39 (15.5)	251	P=0.999
				DF =1
Practice vaginal douching				
Yes	80 (85.1)	14 (14.9)	94	X^2= 0.013
No	137 (84.6)	25 (15.4)	162	P=0.9999
				DF =1
Gestational Age (in trimesters)				
First	9 (60.0)	6 (40.0)	15	X^2= 8.785
Second	85 (89.5)	10 (10.5)	95	P=0.019F
Third	123 (84.2)	23 (15.8)	146	DF =1
Parity				
0-4	212 (84.5)	39 (15.5)	251	X^2= 0.917
5 and above	5 (100.0)	0 (0.0)	5	P=0.999
				DF =1

There was a statistically significant association between prior use of hormonal contraceptives and BV status of participants (P=0.039). There was also a statistically significant association between gestational age in trimester and BV status of participants (p = 0.019)

Table 6: Predictors of Bacterial Vaginosis among Participants

Characteristics	Univariate Logistic Regression			Multivariate Logistic Regression		
	Crude OR	P-Value	95%CI	Adjusted OR	P-Value	95%CI
Age	1.01	0.85	0.941-1.08	1	0.838	0.929-1.094
Tribe						
Indigenes	Ref					
Non Indigenes	0.55	0.23	0.202-1.477	0.56	0.30	0.184-1.684
Occupational Groups						
Unemployed/students	Ref			Ref		
Civil servants/professionals	1.22	0.64	0.528-2.831	0.98	0.961	0.379-2.514
Artisans(hairdressers/tailoress	1.78	0.29	0.601-5.242	1.31	0.640	0.412-4.228
Traders	0.25	0.02	0.075-0.817	0.21	0.017*	0.060-0.759*

Gestational Age						
1st Trimester	Ref			Ref		
2nd Trimester	0.176	0.005	0.0519-0.5997	0.147	0.006*	0.038-0.5727*
3rd Trimester	0.280	0.027	0.0911-0.8638	0.241	0.026*	0.0691-0.845*
Gravidity	1.07	0.47	0.885-1.300	1.096	0.534	0.819-1.467
Parity	0.98	0.90	0.751-1.287	0.959	0.836	0.646-1.422
Smoking						
Yes	Ref			Ref		
No	1.08	0.94	0.126-9.230	0.984	0.964	0.0918-9.784
Vaginal Douching						
Yes	Ref			Ref		
No	1.04	0.91	0.513-2.121	1.26	0.578	0.5556-2.870
Age at first sexual intercourse	0.97	0.59	0.885-1.071	1.002	0.960	0.895-1.123
No. of lifetime sexual partners	1.14	0.33	0.878-1.474	1.12	0.482	0.821-1.519
Condom use						
Yes	Ref			Ref		
No	1.74	0.13	0.849-3.67	1.785	0.160	0.794-4.009
Use of hormonal contraceptive before pregnancy						
Yes	Ref			Ref		
No	3.04	0.04	1.035-8.946	3.06	0.056	0.975-9.640

Discussion

The prevalence of BV among pregnant women was 15.2% and there was no significantly higher rate amongst those who had vaginal discharge when compared to those who did not have vaginal discharge.

The prevalence of BV in this study is comparable to reports of similar studies among pregnant women in other parts of Nigeria[16,18] and indeed Africa[19] but lower than the 27.0% reported in a study in the United States.[20] The higher prevalence in the study carried out in the United States[20] may be due to the documented differences in the resilience of different vaginal communities to the development of BV.[21-22] In fact, in examining BV prevalence by race and ethnicity, the study found a significantly lower rate among Asian/ Pacific Islanders when compared with Native Americans, blacks and Hispanics.[20]

The apparent racial difference in prevalence was explained by some studies[22-24] which showed that a significant proportion of healthy asymptomatic women lack appreciable numbers of lactobacillus species in the vagina but instead have vaginal microflora that consist of other lactic acid-producing bacteria which may not be very resilient to the microbes that cause BV.

This study also showed that the prevalence of BV was lower in the 3rd trimester when compared with the 1st trimester, and this is in consonance with the usual pattern of sexual frequency during pregnancy.[25] This finding is in agreement with that of Adinma et al[16] suggesting an indirect relationship between the frequency of sexual intercourse and the prevalence of genital tract Gardnerella vaginalis.

Several studies have identified numerous sexual risk behavour and other risk factors

associated with BV to include sexual promiscuity and high frequency of vaginal intercourse,[26,27] making it appealing to draw a conclusion that BV may be sexually transmitted. Reduction in sexual activity late in pregnancy is believed to be due to decline in sexual desire borne out of fear of injury to the foetus, inducing labour or difficulty in finding suitable position for coitus late in pregnancy.[28]

The prevalence of BV showed a definite trend with respect to the occupation of the women studied, with traders being the least likely to have BV and the differences reached statistical significance even when subjected to multivariate logistic regression. This differs from the finding by Adinma et al[16] in which the prevalence of G vaginalis showed no trend with respect to the social class of the women studied. Accurate understanding of BV regarding the triggers and factors for the onset and its resolution is still lacking.[29] It is therefore difficult to draw conclusions regarding BV in relation to occupation. Hence more detailed studies on behavioural factors associated with BV among occupational groups are clearly warranted.

The highest prevalence occurred among women who were 35 years and older and this concurs with findings of Nwadioha et al[30] but differs from those of Ibrahim et al[18] and Adinma et al[16] where the highest prevalence of BV were among women aged 20-24 years and 16-20 years respectively. The common denominator in all these studies however, is that the age groups with the highest prevalence of BV are within the reproductive age, which is the most sexually active age group with the highest risk of pregnancies and STD.[30]

Examination of self-reported risk factors revealed no statistically significant relationship between the prevalence of BV and these risks, although some clinical significance could be observed. For instance for every one increase in number of lifetime sexual partner, there was a 1.1 higher chance of having BV among respondents and those who had BV initiated sex at an earlier age. This is in keeping with the findings of other researchers.[26,27] The protective factors against BV examined in this study yielded some clinically but no statistically significant relationship between prevalence of BV and these factors. Participants who did not use hormonal contraceptives prior to pregnancy were 3 times more at risk of having BV and those who had not used condom prior to pregnancy were 1.8 times at risk of having BV. This finding agreed with a longitudinal analysis from a randomized controlled trial[31] which showed that consistent and proper use of condoms may be as effective as sexual abstinence in protecting its recurrence. Moreover, findings from a large cohort study conducted among commercial sex workers in Uganda indicated that hormonal contraception was protective against bacterial vaginosis.[32] This finding has been corroborated in a recent systemic review and meta-analysis where authors found that hormonal contraception reduces the risk of BV and thus has a potential implication for prevention.[33] Perhaps; by ultimately lowering the vaginal PH, hormonal contraceptives inhibit the growth of organisms that cause BV which are known to thrive in alkaline media.[34]

This study relied in part on information obtained with pretested interviewer administered questionnaires with inputs from other reviewed materials; therefore some of the information obtained may not represent the real situation as it relied on the capacity of the respondents to recall. This study also relied on results obtained from laboratory procedures; errors may arise from the human element or from the equipment to influence the results. The fetal outcome of participants diagnosed with BV in the study could not be determined due to the fact that at the time this study was concluded, some of these women had not delivered their babies.

In summary, BV is prevalent among pregnant women with or without vaginal discharge, occurring mostly in the first trimester and least among traders. The risk factors did not reach any statistical significance in the study reinforcing the need for more research on the possible risk factors for BV and on the inverse relationship between BV and hormonal contraceptive use. A multicenter study involving a larger number of pregnant

women would be required. Considering the prevalence of BV in this study, it might just be necessary to include routine screening for BV for all pregnant women attending the antenatal clinic of the hospital.

Conflict of Interest: The authors declare that there is no conflict of interest.

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