



PATTERN OF BACTERIA VAGINOSIS & RISK FACTORS AMONG PREGNANT WOMEN ATTENDING A SECONDARY HOSPITAL AT NIGER STATE, NIGERIA

Shuaibu Bukhari Isah¹, Isah SadiqYelwa², Danasabe Gomina³, Muhammed Auwal Hamid⁴&Onimisi M. Yunus⁵

¹Department of Anti-Retroviral Therapy (ART) Laboratory Ahmadu Bello University Teaching Hospital Zaria-Kaduna

^{2,3} Department of Medical Laboratory Services, General Hospital New Bussa, Niger State

⁴ Department of Medicine Ahmadu Bello University, Zaria Kaduna

⁵Department of Microbiology FUT Minna Niger State

Abstract

Bacterial vaginosis (BV) is the most common cause of vaginal discharge in women of child bearing age, and constitutes one of the main purposes that drive women for obstetrics and gynecological consultations in developing countries. Bacterial vaginosis has become a global health issue because of its adverse effect in pregnancy and in the puerperium. This study is aimed to assess the pattern of Bacteria vaginosis & risk factors among pregnant women attending a secondary hospital at Niger State, Nigeria. A cross-sectional study was conducted. A questionnaire was used to capture socio-demographic, obstetric data & practices that might increase the risk of BV. Vaginal swabs were obtained with the use of sterile swab sticks, smeared on clean glass slides and then Gram stained. The stained smears were observed microscopically for bacterial morphotypes using the X100 oil immersion objective and the Nugent scoring system to determine BV. Data analysis was done using SPSS version 22.0 & were considered significant at $p \leq 0.05$. A total of 170 pregnant women participated in the study with an overall prevalence of BV rated 17.6%. Age group 30-39yrs, parity (3-5), gestational age (3rd trimester) and secondary education were significantly associated with BV, $p < 0.05$. Symptoms such as vaginal itching, Burning with painful urination and characteristic of vaginal discharge such as colour, consistency & odour were significantly associated with BV, $p < 0.05$. BV was higher in the third trimester and many women admitted to practices that might increase the risk of these infections. In conclusion, the overall prevalence of BV in our study population is 17.6% and highest among women aged between 30 & 39 years, Parity (3-5), gestational age (3rd trimester) & pregnant women with highest level of education

Keywords: Niger, Nigeria, Pregnant Women, Bacteria Vaginosis, gynecology, socio-demographic & obstetrics data

INTRODUCTION

Bacterial vaginosis (BV) is an infection usually caused by a complex alteration in the microbial flora of the vaginal with an up to 1000 fold increase in *Gardnerellavaginalis* and leading to depletion in the amount of hydrogen peroxide-producing Lactobacillus and overgrowth of anaerobic bacteria [1]. The reduced numbers of Lactobacillus allow overgrowth of anaerobic bacteria, especially *Mycoplasma hominis*, Bacteroides species, Mobiluncus species and *Gardnerellavaginalis*. Although most of these organisms are present in small number as normal flora of the vagina, Mobiluncus species are rarely found and indicates a sensitive marker for the diagnosis of BV. However, Verstraelen & Swidsinski [2] suggests that *G. vaginalis* is the key player in the pathogenesis of BV initiating the development of a biofilm and then becomes the scaffolding to which other species adhere. Past studies on the microbiota of the epithelial surfaces of vaginal biopsy from women with BV showed that *G. vaginalis* comprised 90% of the bacteria in the biofilm [3]

Bacterial vaginosis (BV) is the most common cause of vaginal discharge in women of child bearing age, and constitutes one of the main purposes that drive women for tocology consultations in developing countries. Bacterial vaginosis has become a global health issue because of its adverse effect in pregnancy and in the puerperium [4-5]. Common symptoms include increased fishy smelling vaginal discharge which is usually white or gray in color. Burning with painful urination may occur and itching is uncommon [6]. Risk factors include douching, multiple sex partners, use of antibiotics, and use of intrauterine device among others [1]. Bacterial vaginosis is also a risk factor for acquisition of herpes simplex virus type 2 (HSV-2), gonorrhea, and chlamydial infection [7]. The incidence of BV has also been associated with a greater occurrence of other sexually transmitted infections like HIV and cytomegalovirus [8]

In pregnancy, BV has been associated with poor pregnancy outcomes. It increases the risk of miscarriage, preterm labor, preterm delivery, chorioamnionitis and postpartum complications such as endometritis and wound infections [9, 10]. Pregnancy is

commonly associated with increased vaginal discharge which is often non-pathological while bacterial vaginosis, candidiasis and trichomoniasis are associated with abnormal vaginal discharge [11]. However, most cases of abnormal vaginal discharge in pregnant women are treated inappropriately as candidiasis as a result of inadequate investigation for other causes. The diagnosis of BV can be made using Amsel's clinical criteria [12] or in the laboratory by scoring bacterial morphotypes from a Gram stain of vaginal fluid [10].

The prevalence of bacterial vaginosis among non-pregnant women ranges from 15-30% [13-14] and in pregnancy, it ranges between 11-16% in developed countries [15-16], 21-29% in Kenya and South Africa [17-18] while in Nigeria, a prevalence rate of 17%, 17.3% , 19.0% and 25% have been reported from separate studies done in the south-east, north-east, north-west and south-west Nigeria respectively [19-22]. This study therefore assessed the pattern of Bacteria vaginosis and risk factors among Pregnant Women Attending a Secondary Hospital at Nigeria State, Nigeria.

MATERIALS AND METHODS

The study was a descriptive cross-sectional study carried out in a Secondary Hospital Niger State, Nigeria. The inclusion criteria were pregnant women who were present at the antenatal clinic with malodorous vaginal discharge, patients who douched with antiseptics, those who recently used antibiotic and who consented to participate in the study, while those patients who did not consent were excluded from the study. A total of 170 pregnant women with abnormal vagina discharge, who met the inclusion criteria and had been adequately counseled were recruited for the study from August 2019 to January 2020.

Data collection: A structured questionnaire was used to collect participants' tocologic (obstetrics)& socio-demographic characteristics includes; Parity, Gestational age, participant's age, marital status, pregnancy status, level of education, and other variables.

Sample collection: The samples analyzed were vaginal swabs and were collected using aseptic techniques from the women with the use of sterile swab sticks. The participant was instructed to lie on the collection bed in a supine position. With both legs flexed, the labial majora was held apart by the participant. A labeled sterile swab was carefully inserted into the vagina and discharge was collected by gently rolling the inserted swab. The swab sticks were recapped and refrigerated (at 4°C) for further processing at the

Macroscopic examination: The odor, consistency and color of each specimen discharge were observed and recorded.

Laboratory Identification of BV: BV was identified using any three of the four criteria recommended by Amsel [14]. These criteria are: presence of homogenous white-grey vaginal discharge; presence of clue cells (>20% of epithelial cells with clue cells) on wet mount; a fishy amine odour of the vaginal discharge before and after addition of 10% KOH (positive whiff test) and a vaginal pH of > 4.5.

Data Analysis: Data obtained from this study was entered into Microsoft Excel and analyzed using SPSS version 22.0. The Chi square test was used to determine the differences in the pattern of BV. Statistical significance was considered at $p \leq 0.05$.

RESULTS

Percentage Distribution of Bacteria Vaginosis among pregnant women attending a secondary hospital Niger State, Nigeria

A total of 170 pregnant women with vaginal discharge within the age range of 20–41 years were recruited for this study. Out of these women with abnormal vaginal discharge, 30 women had bacterial vaginosis with a percentage distribution rate of 17.6% (Fig 1)

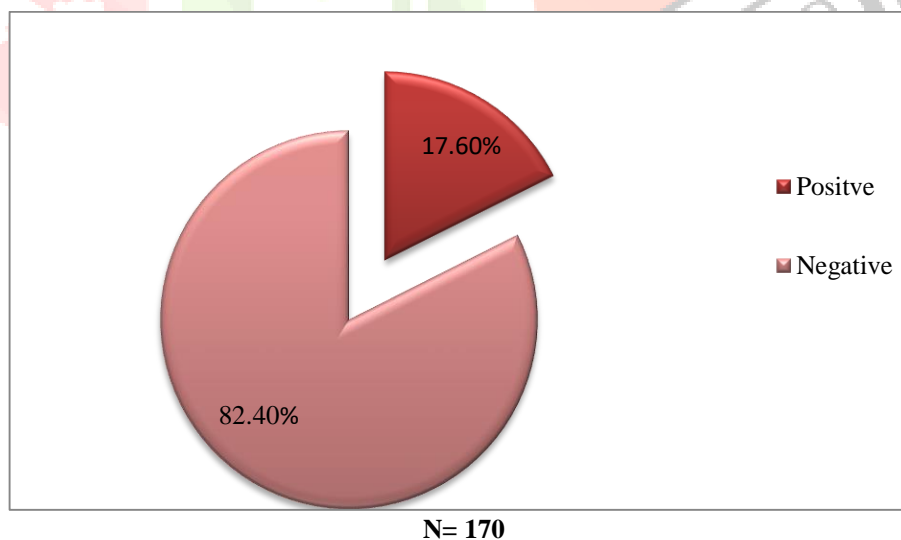


Fig 1: Percentage Distribution of BV among pregnant women attending a secondary hospital Niger State, Nigeria

Distribution of BV by Socio-demographic& Obstetrics Characteristics among Pregnant Women attending a secondary hospital Niger State, Nigeria

Table 1 showed that the parity, education and well as gestational age were found to be significant between the women in the two groups (BV present & BV absent), $p < 0.05$. Whereas the age group was not significant ($P=0.864$).

Table 1: Distribution of Bacteria vaginosis by Socio-demographic & Obstetrics Characteristics among Pregnant Women attending a secondary hospital Niger State, Nigeria

Characteristics	Distribution of BV in Pregnancy		P-value
	BV present (N=30) (%)	BV absent (N=140) (%)	
Age Group (years)			
20-24	2(7.0)	11(8.0)	0.864
25-29	5(16.0)	25(18.0)	
30-34	14(47.0)	55(39.3)	
35-39	8(27.0)	37(26.4)	
≥ 40	1(3.3)	12(9.0)	
Parity			
0-2	9(30.0)	42(30.0)	0.009*
3-5	16(53.3)	78(56.0)	
≥ 6	5(17.0)	20(14.3)	
Educational Level			
Primary	2(7.0)	16(11.4)	0.020*
Secondary	11(37.0)	81(58.0)	
Tertiary	17(57.0)	43(31.0)	
Gestational Age			
1 st Trimester	3(10.0)	25(18.0)	0.009*
2 nd Trimester	10(33.3)	37(26.4)	
3 rd Trimester	17(57.0)	78(56.0)	

* Statistically Significant

Association between BV & symptomatology among pregnant women attending a secondary hospital Niger State, Nigeria

With respect to symptomatology among the two groups of women, statistical significant was observed in the colour of vaginal discharge ($P=0.0001$) & consistency of vaginal discharge ($P=0.001$), while odor of vaginal discharge (malodorous & normal) did not show any statistical difference ($P=0.390$).

Table 2: Association between BV & symptomatology among pregnant women attending a secondary hospital Niger State, Nigeria

Symptoms	BV present N= 30 (%)	BV absent N= 140 (%)	P value
Colour of discharge			
White	4(13.0)	63(45.0)	0.0001*
Yellow	23(77.0)	30(21.4)	
Grey	3(10.0)	47(33.6)	
Consistency discharge			
Thick	7(23.3)	67(48.0)	0.001*
Watery	19(63.3)	28(20.0)	
Frothy	4(13.3)	45(32.0)	
Odour of discharge			
Normal	5(17.0)	29(21.0)	0.390
Malodorous	25(83.0)	111(79.0)	

BV= Bacteria vaginosis

*Statistically significant

BV in relation to Risk Factors among Pregnant Women attending a secondary hospital Niger State, Nigeria

The risk factors for BV among pregnant women were depicted in Table 3. BV among those who had taken antibiotics, those who used antiseptics for vaginal douching, those who used Intrauterine and tight under wear were found to be 70%, 56.7%, 43.3% and 53.3% respectively. While, BV among those who did not take antibiotics, used antiseptics for vaginal douching, use Intrauterine and tight under wear were found to be 30%, 43.3%, 56.7% & 46.7%. However, a positive association was found between those who use intrauterine device and those who wear tight-under wear ($P = 0.0001$), also there was a negative association between use of antibiotic and BV among pregnant women ($P=0.256$). Despite the high percentage of BV among pregnant women who douche regularly (56.7%) compared to pregnant women who did not (43.3%), a statistically higher risk was not found ($P = 0.121$).

Table 3: BV in relation to Risk Factors among Pregnant Women attending a secondary hospital Niger State, Nigeria

Characteristics	BV Present (%) N= 30	BV Absent (%) N= 140	P-value
Recent use of antibiotics			
Yes	21(70.0)	92(66.0)	0.256
No	9(30.0)	48(34.0)	
Use of antiseptic for Vaginal Douching			
Yes	17(56.7)	83(59.0)	0.121
No	13(43.3)	57(41.0)	
Intrauterine device			
Yes	13(43.3)	110(79.0)	0.0001*
No	17(56.7)	30(21.0)	
Tight under wear			
Yes	16(53.3)	51(36.0)	0.0001*
No	14(46.7)	89(64.0)	

BV= Bacteria vaginosis
*Statistically significant

DISCUSSION

The prevalence of 17.6% recorded in this study is comparable with the documented reported prevalence of 6%-32% from studies conducted across the globe [19]. This prevalence is also comparable with figures reported from south-east and north-east of Nigeria by Adinma et al. [23] and Ibrahim et al. [20] & finding of Shuaibu et al. [21] from north-west Nigeria and findings of Afolabi et al. [22] reported from south-west, Nigeria. Although there is no adequate available information in Niger state Nigeria where this study was conducted, this condition remains a major public-health problem in Nigeria based on our findings. This problem is made worst in pregnant women due to its consequences and adverse effects. The impact of bacterial vaginosis in pregnancy for the causation of premature rupture of membranes, preterm delivery and low birth weight is well established Koumanset al., [9]. Bacterial vaginosis is usually considered asymptomatic, and its diagnosis is affordable yet needs technical skill. Failure to detect BV early constitutes a major risk factor for acquiring other vaginal sexually transmitted infections as previously reported [7-8].

Participant's age was not significantly associated with BV although high prevalence were found amongst women aged between 30-34 years; an age range involved with a lot of procreation. This is in agreement with the results of Adinma et al. [23] & Ojiye et al. [4]. A few cases were also observed in women who were between ≥ 40 years. This might be because women of such ages are thought to be at end of their reproductive life and this is in agreement with results from Ojiye et al. [4].

The prevalence of BV was associated with the level of education ($P < 0.02$). Prevalence was higher in educated women compared to those with less education. Among the educated pregnant women, those with tertiary education had higher prevalence when compared with those who attend primary or secondary education, and those who practiced vaginal douching, use of antiseptic soap and those who wore tight underwear. Educated women are usually richer and have more affluence in the society than their uneducated pales. These findings raise the need for public awareness and education on BV in general. Emphasis should be laid on proper hygienic practices as well as the bad sides' use of frequent antibiotics and antiseptics amongst others.

Guzel et al. [24] also found that the prevalence increased with gestational week, and this is related to our finding of increasing prevalence with trimester. We found the prevalence to be higher in the third trimester with 57.0% as compared with 33.3% of those in their second trimester and 10.0% of first trimester pregnancies which was also reported by an earlier study Olowe et al. [25]

CONCLUSION

We therefore, conclude that the prevalence of BV in our study was 17.6% and highest among women aged between 30 and 34 years, highly educated pregnant women, women in their multi-parity(3-5), women in their 3rd trimester and women who practiced poor vaginal hygiene

RECOMMENDATION

We therefore suggest that all pregnant women should be screening for bacterial vaginosis during the routine antenatal clinic visits by the health workers to enable early detection and treatment. Further studies on the pattern of complications of BV, Antimicrobial Susceptibility in pregnant women with malodorous vaginal discharge are needed to determine future strategies for prevention and treatment of bacterial vaginosis in pregnancy.

Acknowledgements

We thank the Chief Medical Director N/Bussa General Hospital, the HOD Medical Laboratory and the entire staff for their collaboration and the participants who made the work possible.

Declaration of Competing Interests

The author(s) declare that they have no competing interests, no financial relationships with any organizations that might have an interest in the submitted work

References

1. Olugbenga, A., O., Olufunmilola, B., M., Rita, O. & Daniel, A., A. (2014). Prevalence of Vulvovaginal Candidiasis, Trichomoniasis and Bacterial Vaginosis Among Pregnant Women Receiving Antenatal Care In Southwestern Nigeria *European Journal of Microbiology and Immunology* 4 (4): 193–197
2. Verstraleen, H., Verhelst, R., Vanechoutte, M., Temmerman, M. (2010). The epidemiology of bacterial vaginosis in relation to sexual behavior. *BMC Infectious Diseases*; 10: 81.
3. Swidsinski, A., Mendling, W. and Loening-Baucke, V. (2005). Adherent biofilms in bacterial vaginosis. *Obstetrics and Gynecology*;106:1013-1023.
4. Ojiyi, E., D., Okeudo, C., Anolue, F., Audu, B., Nggada, H.(2012). The prevalence and predictors of genital tract infections in cervical cytology specimens at a University Teaching Hospital. *International Journal of Gynecology and Obstetrics*:16(1).
5. Nsagha, D., S., Zofou, D., Assob, J., C., N., Njunda, L., Nchang, C., N., Mvougum, N., Patrick, W., E., and Marcellin, N. (2015). The Epidemiology of Trichomonas vaginalis, Gardnerella vaginalis & Candida albican co-infections in women attending the Yaounde University Teaching Hospital. *American Journal of Epidemiology & Infectious Disease* 3(2):28-31.
6. Schwebke, J., R., Burgess, D. (2004). Trichomoniasis. *Clinical Microbiology Reviews*; 17 (4):794-803.
7. Cherpes, T., L., Meyn, L. A. and Krohn, M. A. (2003). Association between acquisition of herpes simplex virus type 2 in women and bacterial vaginosis. *Clinical Infectious Diseases*. 37:319-325.
8. Joesoef, M., R., Hillier, S., L. and Wiknjosastro, G. (1995). Intravaginal clindamycin treatment for bacterial vaginosis: effects on preterm delivery and low birth weight. *American Journal of Obstetrics and Gynecology*. 173: 1527-1531
9. Koumans, H.E., Sternberg, M., Bruce, C., Mcquillan, G., Kendrick, J., Sutton, M. and Markowitz, E. L. (2007). The Prevalence of bacterial vaginosis in the United States, 2001-2004; associations with symptoms, sexual behaviors, and reproductive health. *Sex Transm Dis.*; 34(11): 864-869.
10. Nigeen, W., Bhat, A. S., Gulzar, K. and Taing, S. (2015). Correlation of bacterial vaginosis with preterm labour: a case control study. *Int J Reprod Contracept Obstet Gynecol.*; 4: 1868-74.
11. Ibrahim, S.M., Bukar, M., Galadima, G.B., Audu, B.M. and Ibrahim, H. A. (2014). Prevalence of bacterial vaginosis in pregnant women in Maiduguri, North-Eastern Nigeria. *Niger J Clin Pract.*; 17(2): 154-8.
12. Amsel, R., Totten, P. A., Spiegel, C. A., Chen, K. C., Eschenbach, D. and Holmes, K. K. (1983). Nonspecific vaginitis. Diagnostic criteria and microbial and epidemiologic associations. *Am J Med*; 74(1): 14-22.
13. Rajshree, S., Manju, M., Leena, S. and Vikrant, S. (2014). Effects of Bacterial Vaginosis on Perinatal Outcome. *J Evol Med Dent Sci*. 2014; 3(8): 2040-2046.
14. Tachawatcharapunya, S., Chayachinda, C. and Parkpinyo, N. (2017). The prevalence of bacterial vaginosis in 103 asymptomatic pregnant women during early third trimester and the pregnancy complications. *Thai J ObstetGynaecol*; 25: 96-103.
15. Li, X. D., Tong, F., Zhang, X. J., Pan, W. J., Chen, M. L., Wang, C. C., Li, X., Gao, G. P., Sun, L. and Sun, Y. H. (2015). Incidence and risk factors of bacterial vaginosis among pregnant women: a prospective study in Maanshan city, Anhui Province, China. *J ObstetGynaecol Res.* ; 41(8): 1214-22.
16. Sabour, S., Arzanlou, M., Vaez, H., Rahimi, G., Sahebkar, A. and Khademi, F. (2018). Prevalence of bacterial vaginosis in pregnant and nonpregnant Iranian women; a systematic review and metaanalysis. *Arch Gynecol Obstet.*; 297 (5): 1101-1113.
17. Thomas, T., Choudhri, S., Kariuki, C. and Moses, S. (1996). Identifying cervical infection among pregnant women in Nairobi, Kenya: Limitations of risk assessment and symptom based approaches. *Genitourin Med.*; 72(5): 334-8.
18. Pendharkar, S., Magopane, T., Larsson, P. G., de Bruyn, G., Gray, G. E. Hammarstrom, L. and Marcotte, H. (2013). Identification and characterisation of vaginal lactobacilli from South African women. *BMC Infect Dis.*; 13: 43.
19. Asiegbu, O. G., Asiegbu, U. V., Onwe, B., Iwe, A. B. C. (2018). Prevalence of bacterial vaginosis among antenatal patients at Federal Teaching Hospital Abakaliki, South East Nigeria. *Open J Obstet Gynecol.*; 8: 75-83.
20. Adesiji, Y. O., Taiwo, S. S., Adekanle, D. A., Oboro, V. O., Fayemiwo, S. A., Opaleye, O. O. (2007). Bacterial vaginosis and pregnancy outcome in Osogbo, Nigeria. *Res J Med Sci.*; 1: 195-198.
21. Shuaibu, B., I., Elijah, T., D., Musa, M., Bakare, T., B., and Balogun, O. (2020). "A Retrospective Evaluation of Vaginal Infections amongst Women of Reproductive Age Group Attending Get-Well Women & Children Hospital, Kano Nigeria"., *International Journal of Merging Technologies & Innovative Research*; 7(2) 778-784
22. Afolabi, B. B., Moses, O.E., Oduyebo, O. O. (2016). Bacterial vaginosis and pregnancy outcome in Lagos, Nigeria. *Open Forum Infect Dis.*; 3(1): ofw030.
23. Adinma, J. L., Okwoli, R. N., Agbai, A. O. and Unnaeze, N. C. *Gardnerellavaginalis*vaginosis in Nigerian Igbo women. *Trop J ObstetGynaecol* 2000; 17: 21-23.
24. Guzel, A., B., Ilkit, M., Burgut, R., Urunsak, I., F., and Ozgunen, F., T. (2011). An evaluation of risk factors in pregnant women with Candida vaginitis and the diagnostic value of simultaneous vaginal and rectal sampling. *Mycopathologia* 172(1), 25–36
25. Olowe, O., A., Makanjoula, O., B., Olowe, R., & Adekanle, D., A. (2014). Prevalence of Vulvovaginal candidiasis, Trichomoniasis & Bacterial vaginosis Among Pregnant women receiving Ante-natal care in Southwestern Nigeria. *European Journal of Microbiology & Immunology*; 4(4): 193-197