

Microbiological diagnosis of bacterial vaginosis in pregnant women in a resource limited setting in north central Nigeria

Damen James Garba^{1, *}, Suleiman Shina Zabaze¹, Vem Silas Tabitha¹, Goltong James², Kahansim Makshwar³

¹Department of Medical Laboratory Science, College of Medicine, University of Jos, Jos, Nigeria

²Medical Microbiology Unit, Medical Laboratory Service Dept. Plateau State Specialist Hospital, Jos, Nigeria

³Department of Obstetrics and Gynaecology, College of Medicine, University of Jos, Jos, Nigeria

Email address:

jamesgdamen@yahoo.com (Damen J.G.)

To cite this article:

Damen James Garba, Suleiman Shina Zabaze, Vem, Silas Tabitha, Goltong James, Kahansim Makshwar. Microbiological Diagnosis of Bacterial Vaginosis in Pregnant Women in a Resource Limited Setting in North Central Nigeria. *American Journal of Life Sciences*. Vol. 2, No. 6, 2014, pp. 356-360. doi: 10.11648/j.ajls.20140206.15

Abstract: Bacterial vaginosis or vaginal bacteriosis is a disease of the vagina caused by bacteria. Bacterial vaginosis is an extremely prevalent vaginal condition and the number one cause of bacteria vaginosis among both pregnant and non pregnant women. It has been associated with a significant number of obstetric and gynaecologic complications such as preterm labour and delivery, premature rupture of membranes, spontaneous abortion, chorioamnionitis, postpartum endometritis, post-caesarean delivery, wound infections, post surgical infections, and subclinical pelvic inflammatory disease. *Aim:* The study was to determine the prevalence of bacteria vaginosis in pregnant women and to relate them to age groups, occupation and also to identify other agents of vagina infection in the studied population. *Methods:* A total of 226 pregnant women attending Plateau state specialist hospital with suspected cases of bacteria vaginosis between the months of January to December, 2012 were studied. High vaginal swabs (HVS) were collected using aseptic procedure and processed within 30mins of collection using standard procedures. A drop of 10% KOH was placed over the specimen on the speculum and the odour was noted. The PH of the specimen was determined using PH indicator paper. A wet preparation and Gram stain was carried and examine under the microscope. *Result:* Of the 226 specimen examined 53 (23.5%) were positive for bacteria vaginosis. Thirty six within 16-20 years 8 (22.2%) positive, 41 within 21 to 25 years 14 (34.1%) positive, 26-30 years had 53, 19(35.8%) positive, 42 of 31-35 6(14.3%) positive, 35 of 36-40years 4(11.4%) positive and 19 above 40 years 2(10.5%) positive ($P>0.05$). Second trimester had the highest prevalence of 25(30.1) and least 11(25.9%) recorded by the first trimester ($P<0.05$), Subjects with tertiary educational status had the highest prevalent of 14(41.2% while those at primary level recorded the least the prevalent of 13(17.3%). For civil servants had the highest prevalent of 10(52.6%) while the least was house wife 7 (19.4%). Other vagina infections were *Candida species* (45.4%), *Gardnerella vaginalis* (38.7%) and *Trichomonas vaginalis* (16.0%). **Conclusion:** Bacteria vaginosis is very prevalent among pregnant women in the study area, its diagnosis and treatment should be included in the routine antenatal care of pregnant women.

Keyword: Prevalence, Vagina Discharges, *Gardnerella Vaginalis*

1. Introduction

Bacterial vaginosis or vaginal bacteriosis is a disease of the vagina caused by bacteria¹. Bacterial vaginosis is an extremely prevalent vaginal condition and the number one cause of vagina infection in both pregnant and non pregnant women². It has been associated with a significant number of

obstetrics and gynaecologic complications such as preterm labour and delivery, premature rupture of membranes, spontaneous abortion, chorioamnionitis, post partum endometritis, post-caesarean delivery wound infections, post surgical infections, and sub clinical pelvic inflammatory disease^{3, 4, 5, 6}

Bacterial vaginosis is a polymicrobial, superficial vaginal infection involving a reduction in the amount of Hydrogen

producing lactobacillus and an overgrowth of anaerobic and Gram negative or Gram variable bacteria.^{7,8} The reduced number of Lactobacillus promote overgrowth of anaerobic bacteria including *Mycoplasma hominis*, *Bacterioides species*, *Mobiluncus species* and *Gardnerella vaginalis*^{7,8}. Although most of these organisms are present in small numbers in normal vagina, *Mobiluncus* is rarely found and is a sensitive marker for the diagnosis of Bacterial vaginosis⁹

Bacterial vaginosis is caused by an imbalance of naturally occurring bacterial flora and is often confused with yeast infection (candidiasis) or infection with *Trichomonas vaginalis* (Trichomoniasis) which are not caused by bacteria^{10,11}. Bacterial vaginosis is a common condition; it is the most common vaginal infection in women of child bearing age.

The most common symptom of Bacterial vaginosis is an abnormal homogeneous off-white vaginal discharge (especially after vaginal intercourse) with an unpleasant (usually fishy) smell¹²

2. Materials and Methods

The study was conducted on pregnant women attending ante-natal clinic in Plateau state specialist hospital Jos, North central Nigeria from January to December, 2012. The inclusion criteria were pregnant women with suspected cases of bacteria vaginosis while the exclusion criteria were pregnant women without any symptoms of bacteria vaginosis and those who were on antibiotic treatment or had taken antibiotic for the past two weeks and also those with any chronic illness.

Ethical clearance was sought and approval was given by the ethical committee of the hospital. Informed consent of each of the women was obtained prior to enrolment in to the study.

A structured questionnaire which contains information on age, marital status, trimester, education status and occupation were administered on all the subjects.

The sample size was obtained from

$$N = \frac{z^2(1-p)^2}{d^2}$$

N = minimum sample size, Z = (1.96) constant mean deviation, 1 = constant

p = local prevalence of similar previous study = (11.5%),
d² = Degree of precision adopted for the study = 0.05

Specimen collection: A total of 226 high vaginal swabs samples were collected using aseptic procedure, the specimen were collected with the aid of a sterile speculum, high vaginal swabs were collected from the upper lateral wall of the vagina and the swab returned to the swab container as describe¹³. The sample was then transported to the medical microbiology laboratory and processed within 30mins of collection using standard procedure¹³. The colour of the specimen on the speculum was recorded.

Whiff test: A drop of 10% KOH was also placed over the specimen on the speculum and the odor was noted.

The PH of the specimen was determined using PH indicator paper and the results were recorded accordingly.

Microscopic examination

a. Wet preparation: This was performed by placing a drop of normal saline on a clean glass slide containing vaginal discharges and examined using x40 objectives of a compound microscope for the presence of clue cells (epithelial cells that are coated with bacteria).

b. Gram staining: Gram stain smear of each of the specimen was carried out and Bacteria vaginosis was identified according to¹⁴ which stated that Bacterial vaginosis diagnosis was made based on a combination of the presence of vaginal discharges, positive whiff test, vaginal discharge PH greater than 4.5 and presence of clue cells on microscopy¹⁵

Statistical analysis: The chi square test was used to test for significance between the data obtained.

3. Results

A total of 226 pregnant women attending Plateau state specialist hospital with suspected cases of bacteria vaginosis between the months of January to December, 2012 were studied and 53 (23.5%) were positive for bacteria vaginosis. Thirty six were within 16 to 20 years, 8 (22.2%) positive, 41 within the age groups of 21 to 25 years, 14(34.1%) positive, 26 to 30 years had 53, but 19(35.8%) positive, 31-35 years had 42 and 6(14.3%) positive, 35 were within 36-40 years and 4(11.4%) positive and 19 were above 40 years in which 2(10.5%) were positive. There was a significant difference (p>0.05) on the prevalence of bacteria vaginosis in relation to age groups.

In relation to marital status, single women had the highest prevalence of bacteria vaginosis of 58.3% while the least prevalent of 21.8% was recorded by married subjects. In parity, women who had 3 or more pregnancies had the highest prevalence of 41.2% while the least prevalence of 16.8% were recorded by women who were pregnant for the first time. Educational background showed that women with tertiary education had the highest prevalence 41.2% while the least prevalence of 17.3% was recorded by those with primary education. In terms of occupation, farmers had the highest prevalent of 52.6% while civil servants recorded the least prevalent of 15.6%

Other genital infection identified included Trichomoniasis (78.8%) and Candidiasis (32.3%).

Abnormal vaginal discharges with Bacteria vaginosis showed white 8(15.1%), yellow 27(50.9%) and grey 18(34.0%), while in terms of consistency of the vaginal discharges watery had the highest 28(52.8%) while the least was frothy 9(17.0%). Women in the second trimester had highest prevalent of Bacteria vaginosis 25(30.1%) while the first trimester recorded the least prevalent of 11(15.9%).

Table 1. Socio-demographic and obstetrics characteristics of the studied population

Age groups	No. Examined	No. of BV positive (%)	No. of BV Negative (%)	Chi square	P value
≤20	36	08(22.2)	28(77.8)	13.732	0.017
21-25	41	14(34.1)	27(65.9)		
26-30	53	19(35.8)	34(64.2)		
31-35	42	06(14.3)	36(85.7)		
36-40	35	4(11.4)	31(88.6)		
≥41	19	02(10.5)	17(89.5)		
Marital status					
Single	12	7(58.3)	5(41.7)	9.373	0.009
Married	211	46(21.8)	165(78.2)		
Separated	03	0(0.0)	3(100.0)		
Parity					
1 pregnancy	95	16(16.8)	79(83.2)	8.291	0.016
2 pregnancies	87	23(26.4)	64(73.6)		
3 and more pregnancies	34	14(41.2)	20 (58.2)		
Educational					
Non formal	21	07(33.3)	14(66.7)	8.341	0.039
Primary	75	13(17.3)	62(82.7)		
Secondary	86	19 (22.1)	67(77.9)		
Tertiary	34	14(41.2)	20(58.8)		
Occupation					
Civil servants	77	12(15.6)	65(84.4)	12.680	0.013
Farmers	19	10(52.6)	9(47.4)		
Business	52	15(28.8)	37(71.2))		
House wife	36	07(19.4)	29(80.6)		
Students	32	09(28.1)	23(78.9)		
Other genital infections					
		Chi square	P value		
Trichomoniasis					
Yes	178(78.8)	74.779	0.001		
No	48(21.2)				
Candidiasis					
Yes	73(32.3)	28.319	0.001		
No.	153(67.7)				

Table2. Characteristics of abnormal vaginal discharges in the studied population.

Characteristics	No. BV positive (%)	No. BV Negative (%)	Total	Chi square	P value
Colour					
White	8 (15.1)	83(48.0)	91	18.907	0.001
Yellow	27(50.9)	48(27.7)	75		
Grey	18(34.0)	42(24.3)	60		
Consistency					
Thick	16(30.2)	52(27.7)	68	1.612	0.447
Watery	28(52.8)	78(45.1)	106		
Frothy	9(17.0)	43(24.9)	52		
Mal odour	42(79.0)	84(48.6)	126		
				14.000	0.001

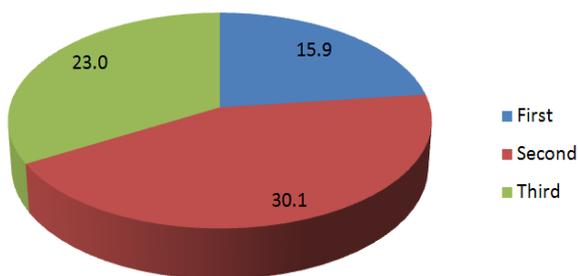


Figure 1. Prevalence of bacteria vaginosis in relation to trimester of pregnancy

4. Discussion

The study showed a prevalence of 23.5% bacteria vaginosis in the studied population, this finding is lower compared with the report of 52.5% in North Eastern Nigeria¹⁶ and 48.1% recorded in South western Nigeria¹⁷ but corresponds with 21-29% reported in some studies among pregnant women in Kenya and South Africa¹⁸⁻²⁰. However our result is higher than 11.5% previously report in the same study area²¹, the variation in the finding might be due to the methods of analysis, Geographic distribution and socio- economic differences in the location of studies.

The age groups of 26-30 years had the highest prevalence of 35.8% which is in variance with that of Ibrahim *et al*¹⁶ who reported the highest prevalence within 20-24 years, Adinma *et al*²² reported within 16-20 years and Nwadioha *et al*²³ within 31-40 years. The differences in prevalence of BV in relation to age groups are statistically significant ($p > 0.05$) this might be associated with the fact that the subjects were within the reproductive age but the rate of sexual activity differs.

The women who were single had the highest prevalence of 58.3% which differs from the report of Adesiji *et al*²⁴ Adeyaba¹⁷ and Ibrahim¹⁶ in which married women had highest prevalence of BV 94.6% and 94.0% respectively these differences could be linked to the fact that single women were more promiscuous than married women, thereby exposing them to vaginal infections.

Multigravida recorded the BV highest prevalence in the study; this is in consonance with previous studies Ibrahim¹⁶, fati²⁵ Nwadioha²³. This is associated with the fact that these groups of women are exposed to several sexual contacts resulting in reduction of physiological barrier in the vagina thereby exposing them to vaginal infections.

Women with tertiary education had the highest BV prevalence of 41.2% which differs from Ibrahim¹⁶ who recorded the highest prevalence of 54% in those with primary education. However there was no statistical significant difference in relation to educational status ($p < 0.05$).

Women who were farmers recorded the highest prevalent BV of 52.6% this corresponds with previous report of Ibrahim¹⁶, Ajani²⁶ but differs from Adesiji²² who reported the highest prevalent BV of 34.3% in traders. The highest prevalence might be associated with the fact that farmers frequently patronize traditional medicine which involves insertion into their vagina and also patent medical shop which do not have qualified medical personnel therefore predisposing them to vaginal infection. However, our findings contradict the report Gibbs²⁷ who stated that Bacteria vaginosis is associated with people of low income, this is because women of high economic status participate more on sexual activities as a way of enjoying themselves there by exposing them to variety of infection. There was a significant difference in prevalence of bacteria vaginosis in relation to occupation.

The prevalence of candidiasis was 45.4% which is the leading cause of vagina discharges in pregnant women in the studied population, this finding is lower compared with previous similar studies of Sobel²⁷ 52.5%, Nwokedi²⁸ 60.0% and 80.0% as recorded²³. The report of *Candida species* associated with vaginal discharges is in agreement with several previous studies^{17,30}, this finding might be due to the fact that *Candida species* in pregnancy is influenced by increase levels of circulating estrogens and deposition of glycogen and other substrates in the vagina during pregnancy.

This study also recorded the prevalence of 16.0% *Trichomonas vaginalis*. This finding is in consonance to Cotch³¹. Trichomoniasis is also a risk factor of acquiring bacterial vaginosis and the complication in pregnancy

includes premature rupture of the membrane, preterm delivery and low birth weight.

Vaginal discharges with white colour had the highest prevalence of 48%, while yellow colour 27.7%, there is no specific colour of vaginal discharges for the diagnosis of bacterial vaginosis, experts varied in opinion but it's important to know that women with bacteria vaginosis presents with abnormal vaginal discharges and the vaginal discharges differs in the consistency. Vaginal discharges with abnormal odour had 79.0% which is statistically significant this finding corresponds with previous studies^{16, 32}

In this study women in the second trimester recorded the highest prevalence of 30.1%, this finding is higher compared with 11.8% recorded¹⁷ in South western Nigeria and 16.0% recorded³² in a population of Danish women within the second trimester this is followed by third trimester 23.0% and the least prevalence of 15.9% in the first trimester, this is might be due to the fact that when the infection is acquired within the first trimester as the pregnancy progresses so is the infection.

BV is very common among pregnant women in the study area and we recommend that the screening for BV should be included into the antenatal investigations.

Acknowledgement

The authors are most grateful to the Doctors and Nurses who had supported us in carrying out this study and the hospital administration for giving us permission for the study and very thankful to the patients that participated in the study.

References

- [1] Gardner H.L. and D. C. Dukes (1955). *Haemophilus vaginalis*; a newly defined specific infection previously classified "nonspecific" vaginitis. *American Journal Obstetric. Gynaecol.* 69: 962.
- [2] Rein, M.F., Holmes, K.K. (1983) Non specific vaginitis, Vulvovaginal candidiasis and trichomoniasis clinical features diagnosis and management *Curr Clin Trop Infect Dis* 4: 281-315.
- [3] Minkoff H., Brunebaun, AN., Schwartz, R.H., Feldman, J., Cummings, M., Crombleholme, W. (1984) Risk factors for prematurity and premature of membrane: a prospective study of the vaginal flora in pregnancy. *American Journal of Obstetrics and Gynaecology* 150: 965-972.
- [4] Gravelt, MC, Nelson, HP, Deroven, T. (1986) Independent association of BV and Chlamydia trachomatis infection with adverse pregnancy outcome *JAMA* 226:1899-1903
- [5] Hillier, S.L., R.P. Nugent, D.A. Eschenbach, M. Krohn, R.S. Gibbs, D.H. Martin et al (1995) Association between bacterial vaginosis and preterm delivery of a low birth weight infant. *New Engl J. Med.* 333:1737-1742
- [6] Leitich, H., Bodner-Adler B., Brunbauer, M., Kaider, A., Egarter, C., Husslein, P. (2003). Vaginosis as a risk factor for preterm delivery: a meta-analysis, *American Journal of Obstetrics and Gynaecology*; 189: 139-147.

- [7] Spiegel, C.A., Amsel, R., Eschenbach, D., Schoenkecht, F., Holmes K.K., (1980); Anaerobic bacteria in nonspecific vaginitis. *New England Journal of Medicine* 303: 601-607.
- [8] Eschenbach, DA, Davick, P.R., Williams, BL., Klebanoff, S.J., Young-Smith, K., Critchlo C.M., Holmes KK., (1989). Prevalence of hydrogen peroxide-producing Lactobacillus species in normal women and women with Bacterial vaginosis, *Journal of clinical Microbiology* 27: 251-256.
- [9] Hillier, S.L., Krohn, M.A., Rabe, L.K., Klebanoff, S.F., Eschenbach, D.A. (1993) The normal vaginal flora, H₂O₂-producing lactobacilli and bacterial vaginosis in pregnant women. *Clinical Infection* 16: S273-281.
- [10] Terri Warren, RN (2010) Is it a yeast infection? Ferris, D. G., Littaker, M.S. Woodward, L, Mathis, D., Hendrich, J. (1995) Treatment of bacterial vaginosis: A comparison of oral metronidazole, metronidazole vaginal gel and clindamycin vaginal cream. *Journal of family practice issue* 41(5): 443-449
- [11] Center for Disease Control and prevention. (2006) Sexually transmitted diseases treatment guideline *MMWR* 55:5-6.
- [12] VanDyck, E, Meheus, AS, Piot, P (1999). Laboratory diagnosis of sexually transmitted disease. *Joint United Nations program on HIV/AIDS Geneva Switzerland pp* 18-21.
- [13] Spiegel, C. A., Amsel, R., Holmes, K.K. (1983). Diagnosis of bacterial vaginosis by direct Gram stain of vaginal fluid 18 (1): 170-171
- [14] Amsel, R., Totten, P.A., Spiegel, C.A., Chen, KCS, Eschenbach, D. Holmes K.K. (1983). Nonspecific vaginitis. Diagnostic criteria and microbial and epidemiologic Associations. *American Journal of Obstetrics and Gynaecology* 74: 14-22.
- [15] Ibrahim SM, M Bukar, GB Galadima1, BM Audu, HA Ibrahim (2014) Prevalence of bacterial vaginosis in pregnant women in Maiduguri, North-Eastern Nigeria *Nigerian Journal of Clinical Practice* 17 (2) 155-158
- [16] Adeyaba, OA, Adeoye, MO, Adesiji, YO (2003) Bacteriological and Parasitological Assessment of vaginitis in pregnant women in Iseyin, Oyo state, Nigeria *African Journal of clinical and experimental microbiology* Vol 4 (2) 116-125.
- [17] Govender L, Hoosen AA, Moodley J, Moodley P, Sturm AW. (1996) Bacterial vaginosis and associated infections in pregnancy. *Int Journal Gynaecol Obstet*; 55:23-8.
- [18] Thomas T, Choudhri S, Kariuki C, Moses S. (1996) Identifying cervical infection among pregnant women in Nairobi, Kenya: Limitations of risk assessment and symptom-based approaches. *Genitourin Med*; 72:334-8.
- [19] Schneider H, Coetzee DJ, Fehler HG, Bellingan A, Dangor Y, Radebe F. (1998). Screening for sexually transmitted diseases in rural South African women. *Sex Transm Infect*; 74 Suppl 1: S147-52.
- [20] Aboderin BW, Motayo BO, Idiong DU, Okerentugba PO, Innocent-Adiele HC, Onoh CC, Nwanze JC, Okonko (2012) Occurrence of *Gardnerella vaginalis* in Women in Jos, Nigeria *New York Science Journal*, 2012; 5(5) 37-40
- [21] Adinma JI, Okwoli NR, Unaeye A, Unaeye N. (2001) Prevalence of *Gardnerella vaginalis* in pregnant Nigerian women. *Afr J Reprod Health* 5:50-5.
- [22] Nwadioha, SI., DZ Egah, EB. Banwat, OO Alao (2010) Microbial agent of abnormal vaginal discharge in pregnant mothers attending primary health care centers of Jos, Nigeria. *Journal of Clinical Medicine and Research* Vol. 2(1) 007-011.
- [23] Adesiyi, YO, SS. Taiwa, DA. Adekanle, V.O. Oboro, SA Fayemiwo and O.O. Opaleye (2007) Bacteria vaginosis and pregnancy outcome in Oshogbo, Nigeria *Research Journal of Medical Science* 1 (4) 195-198.
- [24] Fati, Kirakoya-Samadoulougou, Nicolas Nagot, Marie-Christine Defer, Seydou Yaro, Nicolas Meda, Annie Robert (2008) Bacteria Vaginosis among Pregnant women in Burkina Faso. *Sexually Transmitted Diseases* Vol. 35 (25) 985-989
- [25] Ajani, Grace, Onyin Oduyebo, Muyideen Haruna, Charles Elikwu (2012) Nurgent Scores of Pregnant women in a Tertiary Institution in Nigeria *Advances in Microbiology* 2: 531-536
- [26] Gibbs R. S., Pastorek K., Edelman R., and B. Krohn (1995). Effect of bacterial vaginosis in preterm delivery. *N. Eng. J. Med. Microbiol.* 333(26):1737-42.
- [27] Sobel JD, Faro S, Force RW, Fox B (1998). Vulvovaginal candidiasis. Epidemiologic, diagnostic and therapeutic considerations. *Am. J. Obs. Gynecol.*, 178: 203-211.
- [28] Nwokedi EE, Anyiam NN (2003). A study of high vaginal swabs in Kano Teaching Hospital. A preliminary report. *Highland Medical Research Journal*, 1:57-61.
- [29] Ison CA, Hay PE (2002). Validation of a simplified grading of Gram stained vaginal smears for use in genitourinary medicine clinics, *Sexually Transmitted Infection* 78: 413-415.
- [30] Cotch MF, Pastorek JGH, Nugent RP. (1997). Trichomonas vaginalis associated with low birth and pre-term delivery. *Sexually Transmitted Infect.* 74: 353-360.
- [31] Priestley CJ, Kinghorn GR. (1996) Bacterial vaginosis. *Br J Clin Pract* 50:331-4.
- [32] Vogel, I., Poul Thorsen, Bernard Jeune, BO Jacobsson, Niels Ebbesen, Magnus Arpi, Annie Bremmelgaard, Birger R. Moller (2006). Acquisition and Elimination of Bacterial vaginosis during pregnancy *Infectious Dis Gynaecol* 94646.