



Full Length Research Paper

Bacterial vaginosis among pregnant women attending a primary health care center in Ile-Ife, Nigeria

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Bacterial vaginosis (BV) is one of the most prevalent vaginal infections among women in Africa. In pregnancy, certain complications such as preterm delivery, premature rupture of the membranes, and so on could ensue from BV. This study investigated the prevalence of BV among pregnant women attending antenatal clinic in a primary health care center at Enuwa, Ile-Ife, Nigeria and suggested possible interventions to avoid BV-associated complications in pregnancy. One-hundred and fifty high vaginal samples were collected from pregnant women having vaginal discharge and within the age range 20-40 years. The samples were collected and processed following Amsel criteria and Nugent criteria. Statistical analysis was based on simple percentages among related variables. Fifty pregnant women (33.3%) were identified for BV with Amsel criteria while ninety pregnant women (60%) were identified by Nugent criteria. Bacterial vaginosis was more prevalent among pregnant women in first trimester (36.7%), primigravidae (33.3%), and age group 20 to 25 years (38.9%). Consequently, high rate of BV among pregnant women attending PHC clinics demands adequate attention to prevent BV-associated complications in pregnancy and also reduce referrals that may ensue from such complications. Pregnant women attending antenatal clinic in various PHCs should be screened routinely for BV to avoid infection sequelae. Adequate laboratory facilities should be provided and laboratory personnel should be trained in the use of Nugent criteria for effective diagnosis of BV since the method is convenient and reliable. This will aid prompt and adequate diagnosis of BV in pregnancy. Effort should be made to discourage promiscuity among sexually-active age group and self-diagnosis/medication among pregnant women.

Keywords: Bacteriavaginosis, Primary Health Care, *Gardnerella vaginalis*, Pregnant women, Antenatal clinics, Prevalence

INTRODUCTION

Bacterial vaginosis (BV) is a polymicrobial infection of the genital tract which occur when there is decrease in the

number of hydrogen peroxide-producing *Lactobacillus* and overgrowth of microorganisms such as *Gardnerella vaginalis*, *Bacteroides* spp, *Mycoplasma hominis*, *Mobiluncus* spp, *Prevotella* spp, *Peptostreptococcus* spp, and *Ureaplasma urealyticum* (Rotimi *et al*, 1991; Nelson and Macones, 2002; Lennox *et al*, 2013; Abdelaziz *et al*, 2014; Kraus-Silva *et al*, 2014). Of all the organisms, G.

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vaginalis, *Mobiluncus* spp, and *Atopobiumvaginae* served as essential markers for the diagnosis of BV (Nelson and Macone, 2002; Burton *et al*, 2003; O'Brien, 2008; Gergova *et al*, 2013). Bacterial vaginosis occurs in 35 per cent of women attending Sexually Transmitted Infections clinics, 15–20 per cent of pregnant women and 5–15 per cent of women attending gynaecologic clinics (Money, 2005). It also affects 8–23 per cent of normal pregnant women in developed countries and about 25-50% of infected individuals may remain asymptomatic (O'Brien, 2008; Kraus-Silva *et al*, 2014). The disease is transmitted by direct inoculation of vaginal secretions but it is not clear yet if BV is a sexually transmitted disease (Ison and Easmon, 1985; Nelson and Macones, 2002; Hay, 2005; Georgova *et al*, 2013). Nevertheless, the causative bacteria of BV have been found in the rectum of 20–40 per cent of healthy women and this suggests that BV could also be due to autoinfection (Prescott *et al*, 2005). Furthermore, microorganism associated with Rainbow trout in marine environment has been identified in some BV patients. Probably, the organism colonized the patients through food consumption and ascends from the rectum to the vagina or through direct transfer into the vagina after swimming in a lake or river. However, this demands further investigation (Anukam and Reid, 2007). Bacterial vaginosis has been identified with certain gynaecologic infections and complications in pregnancy including pelvic inflammatory disease, amniotic fluid infection, preterm delivery, preterm labour, preterm rupture of membrane, spontaneous abortion, endometritis, and posthysterectomy vaginal cuff cellulitis (Nelson and Macones, 2002; Prescott *et al*, 2005; Yzeiraj-Kalemajet *et al*, 2013; Ibrahim *et al*, 2014).

In BV, the peptides in the vagina are broken down into amines by the decarboxylases and proteolytic enzymes secreted by the infectious bacteria; the vaginal pH rises above 4.5 and favours the attachment of the bacteria to vaginal epithelial cells forming the characteristic “clue cells”. The activity of the bacterial enzymes also leads to transudation and exfoliation of the “clue cells” (O'Brien, 2008). In this regard, BV is diagnosed clinically by considering three of the following Amsel criteria: (1) vaginal pH above 4.5; (2) thin, white-to-gray homogeneous vaginal discharge; (3) fishy odour from the discharge on addition of a drop of 10% KOH and; (4) the presence of “clue cells”. Usually, the laboratory diagnosis of BV is based on Gram staining of vaginal smear using Nugent scoring system which gives higher sensitivity and specificity than Amsel criteria (Rotimi *et al*, 1991; Nelson and Macone, 2002; Money, 2005; Hay, 2005; O'Brien, 2008; Abdelaziz *et al*, 2014). It is noteworthy that most of the studies conducted in Nigeria and around the world on the prevalence of BV among pregnant women focused on those receiving antenatal care at tertiary health

institutions (Olawuyi, 2011; Ajani *et al*, 2012; Gergova *et al*, 2013; Abdelaziz *et al*, 2014; Ibrahim *et al*, 2014; Kraus-Silva *et al*, 2014). However, to the best of our knowledge, such studies among pregnant women attending antenatal clinic at Primary Health Care (PHC) centers, especially in Southwestern Nigeria, is rare. Primary Health Care is the easiest and closest health services that an individual or family in a community can enjoy. It is accessible and available to everyone wherever they live or work. Also, it is established to tackle the health challenges that could lead to increase in mortality and morbidity at a cost that the community can afford (Alma-Ata Declaration, 1978; Adeyemo, 2005). In the light of this, this study was designed to investigate the prevalence of BV among pregnant women attending antenatal clinic at Enuwa Maternity Center, Ile-Ife, Osun State, Nigeria and also suggest possible interventions to avoid BV-associated complications in pregnancy.

MATERIALS AND METHODS

The study was conducted in primary health care clinic at Enuwa, Ile-Ife, Osun State, Nigeria because most of the referrals of obstetrics emergencies in Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria come from this maternity center (Orji *et al*, 2007). High vaginal swabs (HVS) were collected from one hundred and fifty pregnant women with abnormal vaginal discharge within the age range of 20 to 40 years after informed consent. The samples were properly labeled and moved to the Research and Teaching Laboratory of the Department of Obstetrics, Gynaecology, and Perinatology, Obafemi Awolowo University, Ile-Ife, Nigeria after collection. Using a pH paper in the range of 4.0 to 6.5 and 10% potassium hydroxide (KOH), the pH and fishy odour of the vaginal samples were determined respectively. Clue cells were also identified during wet preparation and microscopy. The HVS samples smeared on clean, grease-free slides were air-dried, heat fixed, Gram stained, and examined with X100 objective. The slides were evaluated for the following morphotypes: Large Gram positive rods (*Lactobacillus* morphotypes), small Gram variable rods (*G. vaginalis* morphotypes), small Gram negative rods (*Bacteroides* morphotypes), and curved Gram variable rods (*Mobiluncus* morphotypes). The Nugent scoring system (a scoring system between 0-10) was then used to evaluate the sum total for each bacterial morphotypes listed above. A score of 0–3 is considered negative for bacterial vaginosis; 4–6 is intermediate while 7–10 is positive for bacterial vaginosis (BV). Statistical analysis was based on simple percentages among related variables.

Table 1. Prevalence of Bacterial vaginosis among pregnant women based on Amsel and Nugent criteria

Parameters	Positive	%	Negative	%
Amsel criteria	50	33.3	100	66.7
Nugent criteria	90	60.0	60	40.0

Table 2. Distribution of the pregnant women based on Nugent criteria

Nugent class	Frequency	%
Normal	50	33.33
Intermediate	10	6.70
BV	90	60.0
Total	150	100

Table 3. Prevalence of BV in relation to trimester

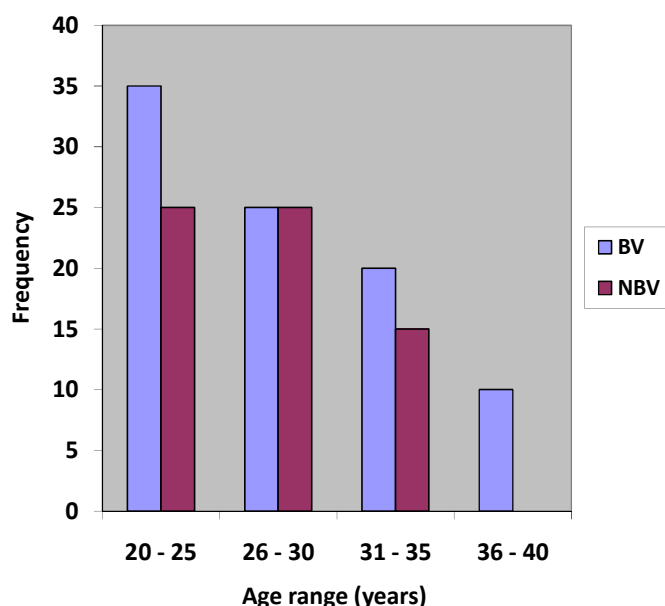
	Trimester		
	First (n = 90)	Second (n = 50)	Third (n = 10)
BV	55 (36.7%)	30 (20%)	5 (3.3%)
NBV	35 (23.3%)	20 (13.3%)	5 (3.3%)

*BV = bacterial vaginosis **NBV = Non-bacterial vaginosis

Table 4. BV prevalence in pregnancy in relation to parity

	Primigravidae (n = 90)	%	Multigravidae (n = 60)	%
BV	50	33.3	40	26.7
NBV	40	26.7	20	13.3

*BV = bacterial vaginosis **NBV = Non-bacterial vaginosis

**Figure 1.** Prevalence of BV according to age range

RESULTS

Fifty (33.3%) of the one-hundred and fifty pregnant women with abnormal vaginal discharge were positive for bacterial vaginosis (BV) using Amsel criteria while ninety (60%) were positive based on Nugent criteria (Table 1). Using Nugent criteria as revealed in Table 2, fifty pregnant women were classified as normal (33.3%); ten as intermediate (6.7%) and ninety as having bacterial vaginosis (60%). Fifty-five of the ninety pregnant women in the first trimester had BV (36.7%) while similar observation was made with 20% and 3.3% of the women in second and third trimesters respectively (Table 3). Also, bacterial vaginosis was more common to primigravidae (33.3%) than multigravidae (26.7%) as shown in Table 4. Prevalence of BV was high across all age groups as revealed in Figure 1. However, it was most prevalent among pregnant women within the age group 20-25 years and this constitutes 38.9% of the total 90 patients positive for BV.

DISCUSSION

Rabiu et al (2010) observed that most women in urban Nigeria prefer seeking treatment at PHCs to other health care centers because of various reasons, particularly accessibility of service at little or no cost. In this study, more BV patients were detected by Nugent criteria than Amsel criteria. The use of Nugent criteria is more reliable in the evaluation of bacterial vaginosis than most techniques (Ibrahim et al, 2014). Interestingly, a previous study showed compatibility between the results of Gram staining (Nugent criteria) and polymerase chain reaction (PCR) in the diagnosis of BV (Gergova et al, 2013). Prevalence of BV among the pregnant women was 60%. Such high prevalence was observed by Ajani et al (2012) and Abdelaziz et al (2014). This might be due to immunosuppression and microbial colonization of vagina due to increased circulating estrogen and deposited glycogen in the vagina during pregnancy (Abdelaziz et al, 2014). Furthermore, BV was most prevalent among the primigravidae and pregnant women within the age range of 20-25 years. This observation was in line with the findings of Gergova et al (2013) among the Bulgarian pregnant and non-pregnant women. Most of the women were within the reproductive age and BV and STDs are common among sexually-active age group (Ajani et al, 2012; Lennox et al, 2013; Ibrahim et al, 2014). Again, the prevalence of BV decreased with increase in trimester. This observation differs from Ibrahim et al (2014) but similar to Ralph et al (1999) cited in Ajani et al (2012) in which the prevalence of BV was higher at the first trimester of pregnancy. Probably, this was due to decrease in coital frequency with increase in trimester. Vaginal intercourse is an important risk factor to BV while deposition of semen in the vagina during intercourse

enhances proliferation of abnormal bacteria flora (Nwadiohaet *al*, 2011). In conclusion, high rate of BV among pregnant women attending PHC clinics demands adequate attention to prevent BV-associated complications in pregnancy and also reduce referrals that may ensue from such complications. Therefore, we recommend as follows: Pregnant women attending antenatal clinic in various PHCs should be screened routinely for BV to avoid infection sequelae. Adequate laboratory facilities should be provided and laboratory personnel should be trained in the use of Nugent criteria for the diagnosis of BV since the method is convenient and reliable. This will aid prompt and adequate diagnosis of BV in pregnancy. Effort should be made to discourage promiscuity among sexually-active age group and self-diagnosis/medication among pregnant women.

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