Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Medicine

journal homepage:www.elsevier.com/locate/apjtm

Document heading doi:

Prevalence of bacterial vaginosis and its risk factors in HIV/AIDS patients with abnormal vaginal discharge

Samuel Nwadioha[1*], Daniel Egah[2], Edmond Banwat[2], Julie Egesie[3], Ifeanyi Onwuezobe[3]

[1]*Medical Microbiology Department, College of Health Sciences, Benue State University, Makurdi*
[2]*Medical Microbiology Department, Jos University Teaching Hospital, Jos*
[3]*Haematology Department, Jos University Teaching Hospital, Jos*
[4]*Medical Microbiology Department, University of Uyo*

ARTICLE INFO

Article history:
Received 25 October 2010
Received in revised form 27 November 2010
Accepted 15 December 2010
Available online 20 February 2011

Keywords:
Bacterial vaginosis
HIV/AIDS
Microscopy
Culture
Sensitivity

ABSTRACT

Objective: To determine the prevalence of bacterial vaginosis in the HIV/AIDS patients of primary health care clinics in Jos Plateau state, Nigeria. **Methods:** Female genital swabs were collected from primary health care centers, Jos and analyzed by microscopy, culture, *etc*. in Jos University Teaching Hospital from December 2006 to December 2007. Data on epidemiologic indices were collected, using structured interviewer-administered questionnaires. **Results:** The incidence of bacterial vaginosis in the study was 28% (n=196/700). Among the HIV/AIDS group, the bacterial vaginosis incidence was 36% (n=126/350), while in the control (non-HIV patients) group, the rate was 20% (70/350) with a statistically significant difference at 95 percent confidence level (P<0.05) . HIV/AIDS and non-HIV (control) patients contributed 64% (n=126/196) and 36% (n=70/196), respectively. The risks to bacterial vaginosis included vaginal douching with disinfectant/detergent constituted (60%), poor use of condom 40%, a median age of 26 years, and a median number of 3 sex partners per week. **Conclusions:** There was a significant statistical difference in prevalence of bacterial vaginosis between the HIV/AIDS group and non-HIV(control) group of patients in the study. Risk behaviors that promote the incidence of bacterial vaginosis should be especially paid attention.

1. Introduction

Bacterial vaginosis (BV) is the most prevalent cause of abnormal vaginal discharge among young women at child bearing age and has sexual promiscuity as a risk factor[1]. It is a gynecologic disorder that is characterized by an offensive malodorous thin and homogenous adherent discharge in the female lower genital tracts. Otherwise, it is colloquially known as "fish odor syndrome". Those affected can suffer from social isolation, depression and attempted suicide-reminiscent of the psychosocial symptoms that can accompany BV[2]. BV is a clinical condition resulting from overgrowth of the vaginal flora. It is characterized by reduced number of *Lactobacilli* and increased presence of *Gardnerella vaginalis (G. vaginalis)*, *Mycoplasma hominis*, *Mobilincus*, *Peptostreptococci* and *Prevotella*[3].

When left untreated, BV is a possible risk for acquisition of HIV/AIDS as well as other complications. Other complications include pelvic inflammatory diseases, premature rupture of membrane and preterm delivery of low birth weight infants. It is now well established that the presence of infective vaginal discharge greatly facilitates transmission and acquisition of HIV between sexual partners[4].

Therefore, prevention, early diagnosis and prompt treatment of this common condition especially among the risk groups are all important to avert the complications and reduce the transmission of HIV. Laboratory support is necessary for a differential diagnosis or to confirm the clinical diagnosis of bacterial vaginosis.

2. Materials and methods

2.1. Study area

The study was done in primary health care (PHC) clinics in Jos, Plateau state of Nigeria. Jos has a moderate population of about 3.5 million and enjoys a near temperate type of climate with attendant tourist activities. There are thriving mining activities, brothels, local beer parlors, hotels and some higher institutions.

*Corresponding author: Dr. Nwadioha S. Iheanacho, Medical Microbiology Department, College of Health Sciences, Benue State University, Makurdi, Nigeria.
Tel: +234- 08056838967
E-mail: samnwa2000@yahoo.com

2.2. Study design

All patients with abnormal vaginal discharge were screened for HIV at the PHC clinics and the positive cases were sent for confirmatory test at AIDS Preventive Initiative in Nigeria (APIN) laboratory in Jos University Teaching Hospital (JUTH), free of charge. Free condoms were given as an incentive. Consent of the patients was received and they were recruited into the study from December 2006 to December 2007. Also, non-HIV (control) group were similarly recruited. They were assured of strict confidentiality of responses. Structured interviewer-administered questionnaire was then introduced. Approval of the study protocol was obtained from ethic committee of Jos University Teaching Hospital. Further permission was obtained from local government councils and the primary health care departments of Jos.

2.3. Laboratory procedure

High vaginal swabs were collected following aseptic precautions[5]. The swabs were immediately sent to the genital bench of medical microbiology and parasitology laboratory of Jos University Teaching Hospital where they were processed according to standard procedures[5].

2.3.1. Macroscopy

Physical examination for the nature, color, consistency of the vaginal discharge was done. A characteristic fishy odor was intensified by adding a drop of 10% potassium hydroxide (KOH) to the vaginal fluid on the examination speculum (WHIFF Test). The pH of the vaginal fluid was measured by touching the pH indicator paper strips to the charged vaginal swabs. The pH generally was elevated to more than 4.5.

2.3.2. Microscopy

A sample of vaginal fluid from a swab-stick was mixed on a glass slide with a drop of normal saline and covered with a cover-slip. Ten fields were examined under high power (×40) objective for clue cells (epithelial cells heavily coated bacteria sufficient to obscure the cell borders), for motile trichomonads and for yeast like cells.

Vaginal smears were Gram-stained. (a) Microscopic evaluation of Gram-stained smear at high power (×40) objective revealed clue cells, usually representing at least 20 percent of vaginal epithelial cells in BV. (b) At oil immersion power (×100) objective, Gram-stain scores of 0-10 were assigned on basis of standardized criteria (Nugent), with 0 representing *Lactobacilli* (large Gram-positive rods)predominant vaginal flora while at the extreme 10 representing flora predominated by *Gardnerella*, *Bacteroides* and *Mobilincus* organisms (small Gram-negative or variable or curved rods). Scores of 0-3 were considered normal, 4-6 borderline for BV and 7-10 diagnostic of BV. A score ⩾4 was used to define abnormal vaginal flora.

2.3.3. Culture

High vaginal swab specimens from BV confirmed cases were further inoculated on to two sets of enriched blood agar media. One set was incubated aerobically while another set was incubated anaerobically, both at temperature of 37 ℃ for 24 to 72 hours. Vaginalis agar (V-agar) was inoculated and incubated in a similar condition and growth was characterized by diffuse hemolysis on human blood single layer agar. Similarly, peptone-starch-dextrose agar media were inoculated and incubated anaerobically at 37 ℃ for 24 to 72 hours, to observe a growth of tiny colonies, which on Gram staining, showed small Gram-negative or variable rods.

Infection with *Candida* species was diagnosed by microscopy of a saline mount, Gram-stained smear of material from the vagina and colonial growth on Sabouraud's Dextrose agar. *Trichomonas vaginalis* was diagnosed by microscopy of a saline mount for the actively motile, spear shaped flagellates. The samples collection, transportation and processing including microscopy and culture were carried out according to recommended standard 5.

2.4. Statistical analysis

The results were analysed using SPSS 11.0 statistical software; chi-square (χ^2) was used to compare association between proportions and *P*-values <0.05 were considered significant at 95.0% confidence level.

3. Result

One hundred and ninety-six *Gardnerella vaginalis* organisms were detected, constituting 28% of the total 700 abnormal vaginal discharge specimens (Table 1). Among the HIV/AIDS group, the bacterial vaginosis incidence was 36% (*n*=126/350), while in the control (non-HIV patients) group, the rate was 20% (70/350) with a statistically significant difference (*P*<0.05). HIV/AIDS and non-HIV (control) patients contributed 64% (*n*=126/196) and 36% (*n*=70/196), respectively. The baseline demographic characteristics of the subjects with BV as recorded are shown in Table 2. The risks to bacterial vaginosis included vaginal douching with disinfectant/detergent constituted (60%), poor use of condom 40%, a median age of 26 years, and a median number of 3 sex partners per week. Three hundred and fifty (50.0%) of the 700 patients with abnormal vaginal discharge recruited in the study were confirmed HIV reactive by western blot. Thirty-six percent (*n*=126/350) of the HIV/AIDS patients with abnormal vaginal discharge were diagnosed of bacterial vaginosis, while 20.0% (*n*=70/350) of non-HIV patients with abnormal vaginal discharge had BV. HIV/AIDS and non-

Table 1

Distribution of bacterial vaginosis in patients with abnormal vaginal discharge in the primary health care clinics of Jos-Nigeria, December 2006-December 2007.

Age (years)	Abnormal vaginal discharge	*G. vaginalis*	*G. vaginalis* in HIV/AIDS	*G. vaginalis* in non-HIV	Other agents of vaginal discharge
0-10	6	-	-	-	6
11-20	173	30	20	10	143
21-30	279	92	59	33	187
31-40	210	57	37	20	153
41-50	30	17	10	7	13
51-60	2	-	-	-	2
Total	700	196	126	70	504

HIV patients contributed 64% (126/196) and 36% (70/196) respectively to the total 196 cases of BV.

Table 2
Demographic characteristics of subjects with BV among the study population [%(*n*)].

Variable		Proportion
Contraception	none	40% (78)
	Condoms alone	25% (49)
	Intrauterine device	20% (40)
	Oral contraception	10% (20)
	Norplant	4% (8)
	surgical	1% (2)
	<75% condom use	40% (78)
Douching/Vaginal cleansing	none	15% (29)
	Water alone	25% (49)
	Soap/detergent/disinfectant	60% (118)
Place of work	brothels	30% (59)
	market women	10% (20)
	bar	20% (40)
	students	10% (20)
	food vendors	15% (29)
Others		5% (10)

4. Discussion

The rate of BV among the general population in the study was 28% (*n*=196/700). Among the HIV/AIDS group in the study, the BV rate was 36% (*n*=126/350) while in the non-HIV group was 20.0% (*n*=70/350). In another study in east Africa, the prevalence of BV was 51% among 4 718 rural Ugandan women[6]. A similar work in Morocco (north Africa) recorded 24% of women with vulvo-vaginal or lower abdominal complaints attending primary health care clinics[7]. BV incidence among pregnant Nigerian women was 17% with a 26% peak among the age group of 16 to 20 years[8]. In another study in Nigeria, BV was identified to be the predictors of HIV[9]. There is strong evidence that the flora association with BV increases the acquisition of HIV[4,10]. It is independently associated with HIV sero-prevalence. HIV infection may promote abnormal vaginal flora or BV may increase susceptibility to sexual transmission of HIV. Alternatively, this association may result from intervening variables. In this case BV may be a marker or a co-factor of HIV transmission[10].

In the study, none use of condom or less than 75% condom use contributed 40% risk of BV. Vaginal intercourse involving women with three or more sex partners per week constituted a high risk. Thirty percent risk was recorded among women working in brothels in the study. From the findings, it can now be deduced that the presence of semen in the vagina allows the abnormal bacteria flora to grow more easily[11]. Some cohorts studies found that women having exposure to a new sex partner or multiple sex partners had an increased incidence of BV[11,12]. Sexually active women have vaginal carriage of *G. vaginalis* more often than sexually inexperienced women[12]. All the above listed factors are also recorded to promote HIV transmission in other notable work[4,13]. Other significant epidemiologic factors of BV in the study were as follows: vaginal douching with soap/detergent/disinfectant (60%); oral contraception (20%); intrauterine device (20%); median age of 26 years. In a prospective study, Avonts *et al* reported a two fold increased incidence of BV among intrauterine contraceptive device users compared to oral contraceptive users.

It is a limitation that quite a number of patients of abnormal vaginal discharge refused to be screened for HIV in the study because it reduced the population sample.

We recommend early diagnosis and prompt treatment of BV in order to avert the complications and reduce HIV transmission.

In conclusion, this study shows that the incidence of BV is higher in HIV/AIDS group. The vaginal intercourse and sexual promiscuity are important risk factors to BV. And vaginal douching and intrauterine devices still remain notable important epidemiologic factors.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

My appreciation goes to PEPFER /APIN(AIDS prevention and initiative in Nigeria) for their free facilities used in the study.

References

[1] Oduyebo OO, Anorlu RI, Ogunsola FT. The effects of antimicrobial therapy on bacterial vaginosis in nonpregnant women. *Cochrane Data Base Systemic Rev* 2009; **3**: 3-6.
[2] Kenneth OB. STDs/HIV/AIDS-Challenge of next millennium. *Nigeria J Genitourinary Med* 2003; **18**: 18-30.
[3] Larsson PG, Carisson B, Fahraeus L. Diagnosis of bacterial vaginosis: need for validation of microscopic image area used for scoring bacterial morphotypes. *Sex Transm Infect* 2004; **80**: 63-7.
[4] Cohen MS. Sexually transmitted diseases and HIV. In: *Highlights of infectious disease society of America*. Annual meeting; 2004.
[5] Betty A, Forbes, Daniel FS, Alice SW, Editors. Genital infections. In: *A handbook on Bailey & Scott's diagnostic microbiology*. 12th edition. Mosby Elsevier Publishers; 2007, p. 856-72.
[6] Sewankambo N, Gray RH, Wawer MJ, Paxton L, McNaim D, Wabwire-Mangen F, et al. HIV-1 infection associated with abnormal vaginal flora. *Lancet* 1997; **350**: 546-50.
[7] Ryan CA. Reproductive tract infection in primary health care, family planning, dermato-venereology clinics: Implications for syndromic management in Arab muslim women. *Sex Transm Infec*1998; **74**: 85.
[8] Adinma JIB, Okwoli NR, Unaeze N. Prevalence of *G. vaginalis* among pregnant Nigerian women. *Afr J Reproductive Health* 2001; **5**: 50-5.
[9] Sagay AS, Kapiga SH, Imade GE, Idoko J. HIV among pregnant women. *Int J Gynecol & Obstetrics* 2005; **90**: 61-7.
[10] Fernandez-limia. Prevalence of bacteria vaginosis, trichomoniasis and candidiasis in women attending STI and Gyne clinics using latex agglutination test. *Int J Gynecol Obstetrics* 2007; **6**: 4-7.
[11] Hawes SE. Hydrogen peroxide producing lactobacilli and acquisition of vaginal infection. *JID* 1996; **174**: 108.
[12] Barbone F, Austin H, Louv WC, Alexander WJ. A follow up study of methods of contraception, sexual activity and rates of bacterial vaginosis. *Am J Obstet Gynecol* 1990; **163**: 510.
[13] Avonts D. Incidence of uncomplicated genital infections in women using oral contraception or an intrauterine device: A prospective study. *Sex Transm Infect* 1990; **17**: 23.