East African Journal of Pure and Applied Science

East African Journal of Pure and Applied Science Vol. 2 (1): 32-46 (2012)

LIFESTYLE BEHAVIOUR, CUSTOMS, TOILET AND VAGINAL HYGIENE PRACTICES AS CONTRIBUTORY FACTORS IN BACTERIAL VAGINOSIS: A CASE OF NAIROBI, KENYA.

Auma, A. C[1], Bukusi, E. A[2] Mutugi, and M[3] Waiyaki, P[4]

1. Kisumu Polytechnic, P.O. Box 143– 40100, Kisumu, Kenya
2. Kenya Medical Research Institute, P.O. Box 19464, 00202, NAIROBI, KENYA
3. Jomo Kenyatta University of Agriculture and Technology, P.O. Box 62000-00200, NAIROBI, KENYA,
4. Kenya Medical Research Institute, P.O. Box 54840-00200, NAIROBI, KENYA

ABSTRACT

Bacterial vaginosis (BV) is a poly-microbial syndrome characterized by a shift in vaginal flora from a predominant population of Lactobacilli to their gradual or total replacement with anaerobes. Non pregnant women seeking care at Special Treatment Centre (STC) in Nairobi, Kenya were evaluated for lifestyle behaviours, customs, toilet, vaginal hygiene practices and BV. The prevalence of BV was found to be 28.5%. Vaginal douching (O.R = 1.874, 95% C.I=1.078- 3.328), cleaning anus with water after defecation (O.R = 2.191, 95% C.I=1.056-4.542) and having at least one sexual partner in the previous two months (O.R = 4.588, 95% C.I=1.586- 13.272) had significant positive association with BV while use of sanitary pads and tampons (O.R = 0.499, 95% C.I=0.252-0.989) had significant negative association with BV. There were significant positive independent association between BV and vaginal douching (O.R = 2.086, 95% C.I=1.154-3.772) and having at least one sexual partner in the previous two months (O.R = 5.302, 95% C.I=1.807-15.554) while there was significant negative independent association between BV and those who used sanitary pads and tampons (O.R = 0.428, 95% C.I=0.207-0.885).

BV prevalence of 28.5% among these participants warrant a better understanding of the link between toilet and vaginal hygiene and their links with BV.

Key words: Bacterial vaginosis (BV), Sexually transmitted infection (STI), vaginal hygiene and toilet hygiene practices.

[1]Corresponding author E-Mail address: aumac2001@yahoo.com

 ISSN 2070 0903

Introduction

Normal vaginal microflora is composed mainly of hydrogen peroxide producing *Lactobacilli* with or without *Gardnerella vaginalis*. In bacterial vaginosis (BV) the quantity of Lactobacilli is severely reduced and anaerobic bacteria predominate along with the facultative organism, *G. vaginalis*. The bacteria load in vaginal fluid also increases (Spiegel, 2002)

There is a high relative risk of acquiring BV in women who have multiple male sexual partners. However, it is not classically considered a sexually transmitted infection (STI) (Nilsson *et al*., 1997). The source of bacteria that colonise the vagina during BV is thought to be the female rectum. However, it is also hypothesised that direct introduction into the vagina of BV related organisms (Holst, 1990) or lactobacilli destroying phages (Tevi-Benissan *et al*., 1997) is the likely cause of BV. Vaginal douching has also been reported as a risk factor to BV (Royce *et al*., 2001).

Bacterial vaginosis (BV) is associated with premature delivery, low birth weight, pelvic inflammatory disease (PID) (Spiegel *et al*., 1991; and Schwebke and Weiss, 2001), and amniotic fluid infection. It can also increase the risk for HIV infection (Cu-Uvin *et al*., 2001).

Prevalence of BV in sub-Saharan Africa is reportedly high (20–51%) among women presenting to sexually transmitted infection (STI) clinics with vaginal discharge (Fonck *et al*., 2000).

The aim of the study was to determine the prevalence of BV in Nairobi and establish any association of BV with lifestyle behaviour, customs, vaginal and toilet hygiene practices.

Materials and methods:

Study Site:

The study was conducted at Special Treatment Centre (STC) in Nairobi, Kenya. STC is under the management of Nairobi city council and is located along river road. STC is specialised in offering care in STI and skin diseases.

Study Population:

In the study, 302 non pregnant women aged between 18 and 49 years, visiting the Special Treatment Centre (STC) to seek care in STI, abnormal vaginal discharge, itching or irritation of vagina and abnormal vaginal odour were enrolled.

Sample and Data Collection:

Women who agreed to participate in the study signed consent forms and were assigned a study number.

Using a formatted questionnaire participants were interviewed on: demographic information, lifestyle behaviour, douching practices, wiping or cleaning anus with water after defecation, contraceptive use, and menstrual hygiene practices. In menstrual hygiene practices they were asked whether they used traditional methods like pieces of cloths or modern methods like sanitary pads and tampons (o.b).

The specimen was collected by higher vaginal swab and a smear prepared immediately and air dried. The air dried slides were packed in slide box ready for transportation to the laboratory.

Laboratory Procedure

The dried smear was fixed in absolute methanol and allowed to drip dry on a slide holder. After drying, the slides were kept in slide box and stored, at room temperature for Gram staining.

The stained smear was examined microscopically, first with the 40x objective to check the staining and to see the distribution of materials, and then with the oil immersion objective to report the bacteria and cells.

Scoring was done using Nugent's criteria (Nugent *et al*., 1991) where the smear was examined for three bacterial morphotypes. The three morphotypes are large gram-positive rods (*Lactobacilli*), small gram-negative or gram-variable rods (*Bacteroides* or *Gardnerella*), and curved gram-variable rods (*Mobiluncus*). Each morphotype was scored individually and the scores totalled.

In scoring more than 10 fields of smear were examined under oil immersion lens and bacteria cells present recorded. The number of large gram-positive rods, number of small gram- negative to gram variable rods and the number of curved rods per field were averaged individually. The three scores were added together to assign the smear to a category. Each slide was scored by two laboratory technicians.

A score of 0-3 was interpreted as consistent with normal vaginal flora; a score of 4-6, corresponding to disturbed flora, was designated as intermediate; and a score of 7-10 was considered to be bacterial vaginosis.

Every tenth slide was reviewed by a third laboratory technician for the purposes of quality control. The third laboratory technician also scored all slides in which the first two laboratory technicians had not agreed.

Ethical Issues

Participants were given complete explanation of the purpose, risks and benefits of the study. Participation was voluntary and each participant signed a consent form. Each participant's Bacterial vaginosis status was kept confidential. Confidentiality was also achieved by identifying study participants by numbers and not names. Respondents were carefully informed that the interview contained questions on bacterial vaginosis matters, which may be sensitive, because the disease involves the female reproductive organ (vagina). Potential risks to subjects included the discomfort from the pelvic examinations (insertion of the speculum) and discomfort during the interview due to the sensitive nature of the questions including loss of privacy, but safeguards were observed to minimize these risks. The benefit to the participants included free laboratory diagnosis for BV by Nugent's criteria and free treatment for BV using Metronidazole tablets as per the World Health Organisation guidelines for the management of sexually transmitted infections 2003. The subjects were given opportunity to review the records in completed study forms and delete any portion they were not comfortable with. Ethical clearance was obtained from KEMRI/National Ethical Review Committee.

Quality control was done by printing data sheets, and checking all entered data with the original patient's files at the end of every week.

Data analysis

Data was analysed using SPSS version 11.5 (SPSS inc., Chicago, IL) program for windows.

The prevalence of BV was determined by generation of frequencies for the relevant variables.

Cross sectional differences between groups were analyzed with the Chi-square test for categorical variables.

Separate logistic regression models were done with each of the main independent variables to estimate adjusted odds ratios and corresponding 95% confidence intervals. All the independent variables which were found to have significant association with BV were all included in multiple logistic regressions to know which factors were independently associated with BV.

RESULTS

Prevalence of BV

The end point of BV was identified by diagnosis using Nugent's criteria. Out of 302 participants 86 were found to be BV positive giving a prevalence of 28.5 %.

Demographic profile of participants

Majority of the women, which made up 43.0%, were aged between 24 and 29 years. (Fig. 1)

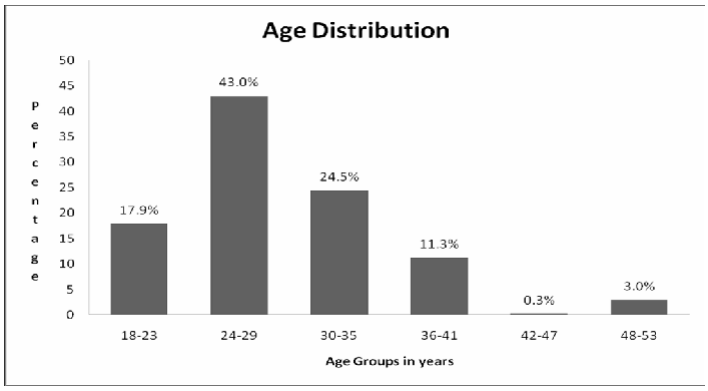

Figure 1: Age distribution of participants

62.3% of the participants were married, 41.7% had up to secondary education and 97% Christians.

82.1% had at least one sexual partner in the previous two months while 74.2% were currently on antibiotics. On occupation, majority were involved in hawking, tailoring and salon business.

65.8% of the women practiced some kind of vaginal douching while 25.2% underwent female genital mutilation. They used hormonal contraceptives more than other forms of contraceptives and 78.5% used modern sanitation (pads and o.b) for sanitation during menses. Condom use in the previous two months was reported by 24.5% of the participants while 11.3% reported cleaning their anus with water after defecation (Table 1).

Table 1: Frequency of demographic factors, lifestyle behaviour, customs, toilet and vaginal hygiene practices

Study population status	**Study population**	**Frequency**	**Percentage**
Religion	Christians	293	97
	Muslims	8	2.6
	None	1	0.3
Education level	Above secondary	53	17.5
	Secondary	126	41.7
	Below secondary	118	39.1
	None	5	1.7
Marital status	Divorced, separated, widowed	33	10.9
	Married like	188	62.3
	Never married	81	26.8

Number of sexual partners in the previous two months	None	44	14.6
	One or more	248	82.1
	Missing	10	3.3
Cleaning anus with water after defecation	Yes	34	11.3
	No	268	88.7
Vaginal douching	Yes	199	65.9
	No	103	34.1
Female genital mutilation	Yes	76	25.2
	No	226	74.8
Condom use in the previous two months	Yes	74	24.5
	No	177	58.6
	Missing	51	16.9
Sanitation during menses	Modern sanitation(pads and o.b)	237	78.5
	Traditional sanitation	36	11.9
	Mixed sanitation	25	8.3
Hormonal contraceptives	Yes	107	35.4
	No	144	47.7
	Missing	51	16.9
Current antibiotic use	Yes	78	25.8
	No	224	74.2

Cross sectional differences between groups

The participants who were more likely to be diagnosed with BV were those who had at least one sexual partner in the previous two months (Pearson Chi-Square=9.252, df=1 and p=0.002), practiced vaginal douching (Pearson Chi-Square=5.021, df=3 and p=0.025), reported cleaning their anus with water after defecation (Pearson Chi-Square=4.602, df=1 and p=0.032) and used modern sanitation (Pearson Chi-Square=4.079, df=1 and p=0.043) (Table 2).

Table 2: Indicators of BV infection status.

Bacterial vaginosis potential sources			**Percentage of occurrence**		**Total**	**P value**
			No	Yes		
Number of sexual partners in previous two months	None	Frequency	40	4	44	0.002
		% within BV	19.00%	4.90%	15.10%	
	One or more	Frequency	170	78	248	
		% within BV	81.00%	95.10%	84.90%	
Vaginal douching	No	Frequency	82	21	103	0.025
		% within BV	38.00%	24.40%	34.10%	
	Yes	Frequency	134	65	199	
		% within BV	62.00%	75.60%	65.90%	

leaning anus with water after defecation	No	Frequency	197	71	268	0.032
		% within BV	91.20%	82.60%	88.70%	
	Yes	Frequency	19	15	34	
		% within BV	8.80%	17.40%	11.30%	
Modern sanitation use	Yes	Frequency	163	74	237	0.043
		% within BV	75.50%	86.00%	78.50%	
	No	Frequency	53	12	65	
		% within BV	24.50%	14.00%	21.50%	

Relationship between lifestyle behaviour, toilet and vaginal hygiene practices with BV

Based on the cross sectional difference between group's results, univariate analysis for risk factors to BV was done using logistic regression.

After univariate analysis, vaginal douching (O.R=1.894, 95% C.I=1.078-3.328), cleaning anus with water after defecation (O.R=2.191, 95% C.I=1.056-4.542) and having at least one sexual partner in the previous two months (OR=4.588, 95% CI= 1.586-13.272) had significant positive association with BV while use of modern methods of sanitation (O.R=0.499, 95% C.I=0.252-0.989) had a significant negative association with BV (Table 3).

Table 3: Odds ratio and 95% C.I for lifestyle and sanitation practices among the study group (Univariate analysis).

Bacterial vaginosis potential sources	**Odds ratio**	**95% Confidence interval**	
		Lower bound	**Upper bound**
Vaginal hygiene practices			
Vaginal douching	1.894	1.078	3.328
Modern sanitation (pads and o.b)	0.499	0.252	0.989
Toilet hygiene practices			
Cleaning anus with water after defecation	2.191	1.056	4.542
Lifestyle behaviuor			
Participants who had one or more sexual partners in the previous two months	4.588	1.586	13.272

Independent association of lifestyle behaviour and vaginal hygiene practices with BV

Multivariate analysis of all the risk factors which were significantly associated with BV was carried out using logistic regression to determine the risk factors which were independently associated with BV.

After multivariate analysis, vaginal douching (O.R=2.086, 95% C.I=1.154-3.772) and having at least one sexual partner in the previous two months (OR=5.302, 95% CI= 1.807-15.554) had significant positive independent association with BV while use of modern methods of sanitation (O.R=0.428, 95% C.I=0.207-0.885) had a significant negative independent association with BV (Table 4).

Table 4: Odds ratio and 95% C.I for lifestyle and sanitation practices among the study group (Multivariate analysis).

Bacterial vaginosis potential sources	**Odds ratio**	**95% confidence interval**	
		Lower bound	**Upper bound**
Vaginal hygiene practices			
Vaginal douching	2.086	1.154	3.772
Modern sanitation (pads and o.b)	0.428	0.207	0.885
Lifestyle behaviuor			
Participants who had one or more sexual partners previous two months	5.302	1.807	15.554

Discussion

The study found out that the prevalence of BV among non pregnant women seeking care for STI at STC was high. A similar study reported high BV prevalence rates among women presenting to sexually transmitted infection (STI) clinics with vaginal discharge in Nairobi, Kenya (Fonck *et al*., 2000).

In this study women who practiced vaginal douching (O.R=1.894), according to univariate analysis, were more likely to be diagnosed with BV than those who did not while according to multivariate analysis vaginal douching (O.R=2.086) was found to have significant positive independent association with BV

In univariate analysis, this study however, showed an association between BV and different methods of sanitation. From the results women who used modern methods of sanitation (O.R=0.499) were significantly less likely to be diagnosed with BV than those who did not use them. This was also supported by multivariate analysis which showed that modern sanitation (O.R=0.428) had significant negative independent association with BV. This study therefore, suggests that modern methods of sanitation could reduce the possibility of altered vaginal flora resulting in BV. By implication, therefore, the traditional and mixed sanitation methods used by these women could encourage possible alteration of vaginal flora. It may further support the introduction of external bacteria and /or bacteriophage as the cause of BV.

Although some researchers in Africa have suggested fecal contamination of genital tract due to poor hygiene and the act of cleaning from anus to the vulva after defecation (Agwu

et al., 2004) currently there is no study which has investigated association between cleaning the anus with water after defecation with BV. who cleaned their anus with water after defecation, on univariate analysis, (O.R=2.191) were significantly more likely to be diagnosed with BV than those who did not. The result supports the postulation that bacteria which are associated with BV originate from the rectum. Cleaning anus with water immediately after defecation transfers the fecal matter to the vagina since it is not possible to clean anus with water without water flowing to the vaginal area.

Finally, on univariate analysis, this study showed that those who had at least one sexual partner in the previous two months (OR=4.588) were significantly more likely to be diagnosed with BV. While on multivariate analysis those who had at least one sexual partner in the previous two months (OR=5.302) had significant positive independent association with BV. A similar study (Hillier *et al.,* 1999) had shown that BV is associated with multiple sex partners just as it has been shown that there is a high risk of acquiring BV in women who have multiple male sex partners (Nilsson *et al*., 1997).

Conclusion

The prevalence of BV among the women participants was high and comparable to that of most studies in Sub Saharan Africa.

Women who douched, cleaned their anus with water after defecation and had at least one sexual partner in the previous two months were more likely to be diagnosed with BV, while women who used modern sanitary methods were less likely to be diagnosed with BV.

Women who douched and had at least one sexual partner in the previous two months had significant positive independent association with BV while women who used modern sanitary methods had significant negative independent association with BV.

This study found out that use of modern sanitation methods could reduce possibility of altered vaginal flora which normally results in BV; while use of mixed and traditional sanitation, by implication, could encourage altered vaginal flora. This is an important finding since it could possibly give an explanation as to why BV prevalence is higher in sub-Saharan Africa than the developed nations.

It is also important to note that no other study carried out in sub-Saharan Africa has had such a finding.

This study was also able to find out a significant positive association between BV and cleaning anus with water after defecation. This was also an important finding in this study since no other study carried out in sub-Saharan Africa had shown association between BV and cleaning anus with water after defecation.

RECOMMENDATIONS

In this study the association of lifestyle behaviour, customs, toilet and vaginal hygiene practices with BV was investigated.

Generally the study found out that women who cleaned their anus with water after defecation were more likely to be diagnosed with BV and also proved that vaginal douching and having at least one sexual partner in the previous two months had significant positive independent association with BV while use of modern sanitary methods had significant negative independent association with BV.

It is therefore necessary that women are advised against cleaning their anus with water after defecation to avoid contaminating the vaginal tract. Multiple sexual partners pose a lot of risk not only in respect to BV but also to other STI including HIV, women and even men should therefore be advised to be faithful to one faithful partner or abstain.

Vaginal douching has been shown to be a risk factor to BV and other conditions like pelvic inflammatory diseases. Women should be advised against vaginal douching since such conditions may results to sterility and other reproductive health complications. Vaginal douching is a risk factor to sterility.

Use of traditional sanitary protection during menses should be discouraged since this practice may introduce external microorganisms in vagina thus contributing to altered vaginal flora which may further graduate to BV.

The link between toilet and vaginal hygiene and their links with BV should be further explored and women advised on the potential confounding effects of douching to discourage this practice especially in sub Saharan Africa.

Finally further studies should be carried out on the links of BV with menstrual hygiene practices and cleaning anus with water after defecation in sub-Saharan Africa as this may help in explaining why BV prevalence in this region is higher than in developed nations.

ACKNOWLEDGEMENT

I would wish to truly thank various people for making this publication a success. The inspiration and support they gave me can not be overemphasized.

First I would like to thank my co-authors; Dr.Elizabeth Bukusi, Dr.Marion Mutugi and Dr.Peter Waiyaki, for their contributions, suggestions and criticisms.

I would also like to thank my research assistant, Opiyo Saola of Special Treatment Centre (STC) for his assistance during data and specimen collection.

REFERENCE

Agwu E., Agba M.I., Nwobu G.O., Isibor J.O., Okpala H.I., Ohihion A.A. and Uzoaru S.C. (2004). Pattern of Bacterial Urinary Tract Infection Among Female Students of National Veterinary Research Institute. *Journal of Biomedical Sciences in Africa* **2**(2):15-17.

Cu-Uvin S., Hogan J.W., Caliendo A.M., Harwell J., Mayer K.H. and Carpenter C.C. (2001). Association between bacterial vaginosis and expression of human immunodeficiency virus type 1 RNA in the female genital tract. *Clinical Infectious Diseases* **33**:894-896.

Fonck K., Kidula N., Jaoko W., Estambale B., Claeys P., Ndinya-Achola J., Kirui P., Bwayo J. and Temmerman M. (2000). Validity of the vaginal discharge algorithm among pregnant and non-pregnant women in Nairobi, Kenya. *Sexually Transmitted Infections* **76**:33-38.

Hillier S.L. and Holmes (1999). Bacterial vaginosis. *Sexually Transmitted Diseases, 3rd Edition. New York: Mcgraw-Hill* 536-586.

Holst E. (1990). Reservoir of four organisms associated with bacterial vaginosis suggests lack of sexual transmission. *Journal of Clinical Microbiology* **28**:2035-2039.

Nilsson U., Hellberg D., Shoubnikova M., Nilsson S. and Mardh P.A. (1997). Sexual behavior risk factors associated with bacterial vaginosis and Chlamydia trachomatis infection. *Sexually Transmitted Diseases* 241-6.

Nugent B.P., Krohn M.A. and Hillier S.L. (1991). Reliability of diagnosing bacterial vaginosis by a standardized method of Gram stain interpretation. *Journal of Clinical Microbiology* **29**:297-301.

Royce R.A., French J.I., Savitz D.A. and Thorp J. (2001).Vaginal douching, bacterial vaginosis, and preterm birth. *Congress of Epidemiology Abstract* S161.

Schwebke J.R. and Weiss HL. (2001). Interrelationships of bacterial vaginosis and cervical inflammation. *Sexually Transmitted Diseases* **29**: 59-64.

Spiegel C.A. (2002). Bacterial Vaginosis. *Reviews of Medical Microbiology* **13**(2): 43-51

Spiegel C.A. (1991). Bacterial vaginosis. *Clinical Microbiology Reviews* **4**:485-502.

Tevi-Benissan C., Belec L., Levy M., Schneider-Fauveau V., Si Mohamed A., Hallouin M.C., Matta M. and Gresenguet G. (1997). In vivo semen-associated pH neutralization of cervicovaginal secretions. *Clinical Diagnostic Laboratory of Immunology* **4**:367-74.