Prevalence of bacterial vaginosis in lesbians and heterosexual women in a community setting

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See linked editorial, p 424

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Objectives: High prevalence of bacterial vaginosis (BV) has been reported in lesbians but most studies were based in sexually transmitted infection clinic settings; therefore, we wished to determine the prevalence and risk factors of BV in lesbians and heterosexual women in a community setting in the UK.

Methods: A cross-sectional study recruiting lesbian women volunteers from community groups, events, clubs and bars. Heterosexual women were recruited from a community family planning clinic. They self-swabbed to create a vaginal smear, which was Gram-stained and categorised as BV, intermediate or normal flora. They completed a questionnaire about age, ethnic group, smoking, genital hygiene practices and sexual history.

Results: Of 189 heterosexuals and 171 lesbians recruited, 354 had gradeable flora. BV was identified in 43 (25.7%) lesbians and 27 (14.4%) heterosexuals (adjusted OR 2.45, 95% CI 1.25 to 4.82; $p=0.009$).

Concordance of vaginal flora within lesbian partnerships was significantly greater than expected (27/31 (87%) couples, $\kappa=0.63$; $p<0.001$). Smoking significantly increased the risk of BV regardless of sexuality (adjusted OR 2.65; $p=0.001$) and showed substantial concordance in lesbian partnerships but less than for concordance of flora.

Conclusions: Women who identified as lesbians have a 2.5-fold increased likelihood of BV compared with heterosexual women. The prevalence is slightly lower than clinic-based studies and as volunteers were recruited in community settings, this figure may be more representative of lesbians who attend gay venues. Higher concordance of vaginal flora within lesbian partnerships may support the hypothesis of a sexually transmissible factor or reflect common risk factors such as smoking.

High prevalence of bacterial vaginosis (BV) (between 29 and 52%) has been reported in lesbians in UK and US studies,^{1–5} with the suggestion that the prevalence is significantly higher than in heterosexual women. These studies were based in sexually transmitted infection (STI) clinic settings so may represent a selected sample of lesbian women who were symptomatic, or concerned about STI risk, and may not be representative of lesbian women in general. This is supported by a recent US study, which invited women who have sex with women (WSW) only volunteers to attend for a clinic assessment and found a slightly lower BV prevalence of 25%.⁶

Comparison of lesbian, WSW and heterosexual data can also be problematic since sexual behaviour surveys in both the UK and Australia have shown higher numbers of male partners reported by bisexual than heterosexual women,^{7,8} with less male partners specifically indicated by Australian lesbian identifying women.⁸ Recent change of sexual partner⁹ and having multiple partners compared to a single partner¹⁰ have been associated with BV.

Potential mechanisms for an increase in BV in lesbians may be because of genital hygiene behaviours or sexual practices. Certain vulval cleansing agents and vaginal douching may affect the vaginal ecology through alteration of pH or bactericidal effects on the normal lactobacilli and so predispose to BV.¹¹ It has been suggested that receptive oral sex could introduce abnormal flora or lactobacillus phages into the vagina, or that a salivary mediator could cause alteration in the vaginal flora.^{12–14} A high concordance of vaginal flora between lesbian partners has led to the suggestion of a sexually transmissible factor, transmitted by exchange of vaginal secretions,^{3,6} similar to the original Gardner and Dukes experimental work.¹⁵ Smoking has also been associated with increased risk of BV.¹⁶

We therefore aimed to determine and compare the prevalence of BV in lesbians and heterosexual women in community settings outside the STI service in the UK, and investigate other factors known to be associated with BV. We also aimed to look at the vaginal flora of any lesbian partnerships for concordance.

METHODS

A cross-sectional study of lesbian and heterosexual women volunteers was conducted between 2001 and 2004. The local research ethics committee had approved the study.

Women who self-identified as lesbians were recruited from community groups, events and bars across West Yorkshire and Manchester, UK. A stall was set-up at each venue with leaflet and poster information concerning the research project and associated sexual health matters. Convenience sampling of women was then used. "Lesbian" as an identifier was retained in preference to "WSW" after informally canvassing volunteers' views at the pilot community event. The heterosexual comparison group was recruited from a community family planning clinic in Leeds, UK, where women were approached in the waiting area.

Women who gave informed consent and were aged 16 to 50 years were invited to participate. Exclusion criteria were the use of oral or vaginal antimicrobial agents within the past 2 weeks, menstruation at the time of the swab, having an intrauterine contraceptive device *in situ*, and women consulting the family planning clinic solely for investigations and management of vaginal discharge.

The women were instructed by female investigators on how to take their own vaginal sample and create a vaginal smear on

Abbreviations: BV, bacterial vaginosis; ROS, receptive oral sex; STI, sexually transmitted infection; WSW, women who have sex with women

a numbered glass microscope slide. Such self-taken swabs have been validated as a satisfactory method of sampling vaginal flora.¹⁷ They self-completed an accompanying numbered anonymised paper questionnaire, which asked questions about age, ethnic group, smoking, usual genital hygiene practices and sexual history. Heterosexuals were asked about method of contraception used. We asked lesbians to indicate the study number of their current partner if they were also taking part in the study (we did not ask the duration of this relationship or otherwise qualify “partner”).

The vaginal smears were Gram-stained and were analysed by two independent observers (ALE and JDW) and using the Hay-Ison criteria¹⁸ were categorised as BV, intermediate or normal flora. Where there was discrepancy between the observers, the slides were reviewed and a consensus reached. The observers were blinded to each other’s findings and to the sexuality of the women.

The data were analysed using Stata version 9.2. The multiple logistic regression model was built by inclusion of each variable in a stepwise way. The risk factor variables investigated in the model were those significant on univariate analysis ($p \leq 0.05$) and those thought to be important from the published literature. A sample size calculation was performed to detect a 10% difference in BV rate between lesbians and heterosexuals. For 80% power, using a type 1 error of 0.05 and a two-tailed test of proportions, 160 per group would be required to detect a BV rate of 0.15 versus 0.05, and 219 per group would be required to detect a BV rate of 0.2 versus 0.1.

RESULTS

The overall response rate was 63.7% (360/565) with 68.5% (189/276) of the heterosexual women responding and 59.2% (171/289) of the lesbian women. No information was available from the women who declined to participate, so we cannot be sure that the participants are representative of all women in these groups. The response rates to individual questions varied, but 100% self-identified their sexuality, over 95% gave responses to one or more questions on sexual history, current smoking habit, genital hygiene practices and the presence of symptoms, and over 90% gave their age and ethnic group. The sample groups are described in table 1.

Lesbians were significantly older than heterosexuals and there were significantly fewer non-Caucasian women in the lesbian group compared to heterosexuals. Forty per cent of the women were smokers, with no significant difference in smoking habit between the lesbian and heterosexual women.

Lesbians had a median of four lifetime female partners and 74.9% had a previous male partner. Three had a male partner (range 1 week to 6 months) more recently than they had a female partner (range 5 months to 2 years). Two lesbians declared male partners only and two declared no male/female partners at all (and are therefore ostensibly virgins). Receptive oral sex (ROS) was practised by 83.3% of lesbians.

The heterosexuals had a median of eight lifetime male partners and 7.7% had a previous female sexual partner. None had a female partner more recently than a male partner (range 1 month to 7 years). ROS was practised by 82.1% in the heterosexual group; two women declared ROS only.

There was good correlation of vaginal flora grading with only 19/360 discrepant results between the two observers ($\kappa = 0.87$, 95% confidence interval (CI) 0.79 to 0.95; $p < 0.001$). Six slides were ungradeable for technical reasons and therefore excluded from the analysis (4/171 lesbians and 2/189 heterosexuals). The prevalence of BV was 19.8% (70/354), but this was higher in lesbians at 25.7% (43/167) compared to 14.4% (27/187) in the heterosexuals. In lesbian and heterosexual women, respectively, normal flora were present in 68.9% (115/167) and 82.9%

(155/187) and intermediate flora in 5.4% (9/167) and 2.7% (5/187).

Vaginal flora and univariate analyses

Univariate analyses were performed comparing data for women with BV versus women with normal or intermediate flora (table 2). Data for women with ungradeable slides were excluded. Lesbian women had a significantly higher risk of BV than heterosexual women (crude odds ratio (OR) 2.05, 95% CI 1.16 to 3.64; $p = 0.011$).

Women who smoked had a significantly increased risk of BV. There was also a trend for increasing association with BV and higher number of cigarettes smoked per day. Abnormal odour was reported significantly more frequently in women with BV. Interestingly, the use of bubble bath was associated with a lower rate of BV. There was a significant increase in BV risk in women with highest lifetime number of female partners (11+ category) compared to women with zero female partners.

There was no association between BV and age or age category, mean age 26.7 years (SD 7.2, range 16–42) in the women with BV versus 27.3 (SD 6.9, range 16–49) in the women with normal or intermediate flora. There was also no association between BV and ethnic group (or Caucasian vs non-Caucasian categorisation: 88% with BV were Caucasian versus 92% with normal or intermediate flora). Regarding symptoms and genital hygiene, there was no association between vaginal flora and vaginal discharge, antiseptic use on the vulva or in the bath or douching (which was only practised by 12% of women).

There was no association between vaginal flora and lifetime number of male partners, timing of last sexual intercourse with a male or female partner or time since sexual intercourse with a different partner. ROS was not associated with an increase in BV, being practised in 78% of women with BV and 84% of those with normal or intermediate flora. There was also no association between vaginal flora and frequency of ROS.

Hormonal methods of contraception (combined oral contraceptive pill, progesterone-only pill, depot-progesterone) were used by 51% (87/169) of the heterosexuals. There was no association between the use of these types of contraception and vaginal flora, but previous studies have reported a lower rate of BV in association with hormonal contraception.^{19 20} Non-hormonal contraception (condoms, diaphragm, withdrawal, rhythm method, vasectomy) or no contraception was used by 49% (82/169) of heterosexual women.

Multivariate analysis

Logistic regression was performed using risk factor variables significant on univariate analysis—namely, sexuality, smoking and bubble bath use. Age and ethnic group were kept in the model as these were felt to be key variables whose absence could confound, have been shown to be associated with vaginal flora previously and which significantly differed between lesbians and heterosexuals. Only complete datasets for all the variables of the women with BV, normal and intermediate flora were included, yielding a total sample size of 311 cases. The significant results of the logistic regression are shown in table 3. It can be seen that the co-factors lesbian sexuality and smoking are independently significant in increasing BV risk by a factor of approximately 2.5 and 2.7, respectively. Bubble bath use lowers BV risk by half. Douching exerted no effect.

Age (as a continuous variable) is not significant but controlling for age increases the influence of lesbian sexual identity on BV risk. There was no significant effect in addition to sexuality from adding the sexual behaviour variables of ROS frequency, ever having a female partner, timing of last or past sex with a female or male partner, or number of male partners. Number of female partners showed significant collinearity with

Table 1 Description of the sample groups (n = 360)

	Lesbian (n = 171)		Heterosexual (n = 189)		p Value
	Number	(%)	Number	(%)	
Age (years) (n = 329)					
Mean (SD)	30.3 (6.8)		24.2 (5.5)		<0.001*
Range	17–49		16–39		
Ethnic group (n = 337)					
Caucasian	154	(96.3)	154	(87.0)	0.003†
Black African	0		5	(2.8)	
Other	6	(3.8)	9	(5.1)	
Asian	0		9	(5.1)	
Smoking (n = 344)					
Non-smoker	107	(64.5)	100	(56.2)	0.12†
Smoker	59	(35.5)	78	(43.8)	
Female partner ever (n = 352)					
Yes	167	(98.2)	14	(7.7)	<0.001†
No	3	(1.8)	168	(92.3)	
Lifetime number female partners (n = 349)					
Median	4.0		0		<0.001*
Range	0–90		0–5		
Male partner ever (n = 353)					
Yes	128	(74.9)	182	(100)	<0.001‡
No	43	(25.1)	0	(0)	
Lifetime number male partners (n = 333)					
Median	2.0		8.0		<0.001*
Range	0–200		1–100		
Receptive oral sex (n = 347)					
Yes	140	(83.3)	147	(82.1)	0.77†
No	28	(16.7)	32	(17.9)	
Bubble bath use					
Yes	87	(51.2)	86	47.3	0.46†
No	83	(48.8)	96	52.7	

*Mann-Whitney U; † χ^2 or χ^2 for trend; ‡Fisher's exact

sexuality and when incorporated into the model had little effect.

Smoking status was collinear with number of cigarettes smoked per day so we were unable to also include cigarettes smoked per day in the final model. However, when cigarettes smoked per day was modelled, a significant association with BV was seen, which increased as cigarettes smoked per day increased from ≤ 10 to 11–20 to >20 .

Ethnic group categorised as Caucasian versus non-Caucasian was used in preference to individual ethnic group due to zero values for lesbian sexuality in Asian and Black African groups causing problems in the model. A non-significant association between BV and non-Caucasian ethnic group was seen in our largely Caucasian cohort.

A separate model examining contraception, sexual identity and flora showed no effect of hormonal or non-hormonal contraception use amongst the heterosexuals.

Concordance of vaginal flora in lesbian partners

There were 33 lesbian partnerships in the study. The prevalence of BV in this subset of lesbians was 21.2% and therefore not significantly different to the other lesbians. Consistent with other studies^{3–6} we considered flora concordant when both partners had BV or both had no BV (19 both normal, 5 both BV, 3 normal and intermediate). We excluded two partnerships where one subject had ungradeable slides. Discordant flora was seen in four partnerships (2 normal/BV; 2 BV/intermediate). Concordant flora was therefore seen in 87% (27/31) partnerships. This is significantly higher than the 65% concordance expected by chance ($\kappa = 0.63$, 95% CI 0.46 to 0.81; $p < 0.001$; indicating substantial agreement). We examined the concordance of smoking habit in these lesbian partnerships and found moderate agreement (80% vs 58% expected, $\kappa = 0.53$, 95% CI 0.35 to 0.71; $p = 0.0018$) but less so than for agreement of vaginal flora in the same partnerships.

DISCUSSION

This convenience sample study, using self-taken vaginal samples and self-completed questionnaires, recruited both lesbian and heterosexual women from community settings in the UK. Enrolment into the study was reasonable but uptake was greater by the heterosexual group. The slide quality was good with only 1.7% ungradeable slides, contributing to good agreement between observers.

Our data confirms that women who identify as lesbians have a 2.5-fold increase in BV risk compared with heterosexual women. The prevalence of 25.7% is lower than clinic-based study findings and may be more representative of lesbians who attend gay venues, events and community groups.

We found a univariate association between BV and highest lifetime number of female partners, but partner number did not have a significant effect on the regression model. Previous studies have reported associations with BV in women with greater number of lifetime female partners.^{6–21} These studies included larger numbers of lesbian women (326 and 708) than our study. A confounding variable that correlates with lesbian sexuality, such as a specific sexual practice, duration of partnership or a nonsexual factor, may therefore be at play. We did not ask about sexual practices that may facilitate transfer of vaginal secretions. However, previous studies have reported mixed findings. One study of 326 women reported an association between BV and failure to always clean an insertive sex toy before use, and oral-anal sex with female partners,⁶ but other studies with 708 and 91 women failed to find any association between BV and sexual practices that could transmit vaginal secretions from one woman to another.^{4–21}

We found no association between receptive oral sex and BV. This sexual practice was commonly reported in both heterosexual and lesbian women making assessment of effect problematic but failing to support the hypothesis for transfer of oral anaerobic bacteria or hostile salivary enzymes.^{12–14}

Table 2 Association of variables with bacterial vaginosis and normal or intermediate vaginal flora on univariate analysis

	Women with BV (n=70) (%)	Women with normal flora (n=270) (%)	Women with intermediate flora (n=14) (%)	Univariate OR normal + intermediate vs BV (95% CI)	p Value
Age (years) (n=323)					
≤19	11 (31.4)	23 (65.7)	1 (2.9)	1	
20–29	34 (19.5)	132 (75.9)	8 (4.6)	0.53 (0.22 to 1.28)	
30–39	19 (18.8)	77 (76.2)	5 (5.0)	0.51 (0.19 to 1.32)	
≥40	2 (15.4)	11 (84.6)	0	0.40 (0.05 to 2.46)	0.19†
Ethnic group (n=331)					
Caucasian	58 (19.2)	231 (76.5)	13 (4.3)	1	
Black African	0	4 (80.0)	1 (20.0)	–	
Other	4 (26.7)	11 (73.3)	0	1.53 (0.39 to 5.45)	
Asian	4 (44.4)	5 (55.6)	0	3.37 (0.73 to 15.02)	0.10†
Sexual identity (n=354)					
Heterosexual	27 (14.4)	155 (82.9)	5 (2.7)	1	
Lesbian	43 (25.7)	115 (68.9)	9 (5.4)	2.05 (1.16 to 3.64)	0.011
Smoking status (n=338)					
Non-smoker	30 (14.7)	163 (79.9)	11 (5.4)	1	
Smoker	39 (29.1)	92 (68.7)	3 (2.2)	2.38 (1.35 to 4.22)	0.002
Number cigarettes smoked per day (n=122)‡					
≤10 cigarettes/day	22 (27.8)	57 (72.2)	0	2.24 (1.14 to 4.38)	
11–20 cigarettes/day	13 (35.1)	22 (59.5)	2 (5.4)	3.14 (1.34 to 7.31)	
>20 cigarettes/day	3 (50.0)	3 (50.0)	0	5.80 (0.88 to 38.29)	< 0.001†
Symptoms					
Discharge (n=340)					
No	34 (17.7)	153 (79.7)	5 (2.6)	1	
Yes	33 (22.3)	106 (71.6)	9 (6.1)	1.33 (0.75 to 2.36)	0.36
Abnormal odour (n=339)					
No	49 (17.1)	225 (78.7)	12 (4.2)	1	
Yes	18 (34.0)	34 (64.1)	1 (1.9)	2.49 (1.24 to 4.97)	0.008
Genital hygiene					
Bubble bath use (n=346)					
No	44 (25.3)	125 (71.8)	5 (2.9)	1	
Yes	25 (14.5)	138 (80.2)	9 (5.2)	0.50 (0.28 to 0.90)	0.018
Antiseptic in bath (n=347)					
No	69 (20.7)	253 (76.0)	11 (3.3)	1	
Yes	1 (7.1)	10 (71.4)	3 (21.4)	0.29 (0.01 to 2.21)	0.32*
Antiseptic on vulva (n=347)					
No	68 (20.2)	256 (76.0)	13 (3.9)	1	
Yes	2 (20.0)	8 (80.0)	0	0.99 (0 to 4.23)	1.0*
Douching (n=346)					
No	62 (20.5)	227 (74.9)	14 (4.6)	1	
Yes	7 (16.3)	36 (83.7)	0	0.76 (0.29 to 1.88)	0.66
Sexual behaviour					
Receptive oral sex (n=341)					
No	15 (25.9)	41 (70.7)	2 (3.4)	1	
Yes	54 (19.1)	217 (76.7)	12 (4.2)	0.68 (0.33 to 1.38)	0.32
Receptive oral sex frequency (n=274)§					
>1 per week	22 (19.6)	84 (75.0)	6 (5.4)	0.70 (0.31 to 1.59)	
Every 1–2 weeks	12 (21.1)	42 (73.7)	3 (5.3)	0.76 (0.29 to 1.98)	
Every 2–3 weeks	15 (15.8)	77 (81.1)	3 (3.2)	0.54 (0.22 to 1.29)	
<Every 2–3 weeks	4 (40.0)	6 (60.0)	0	1.91 (0.38 to 9.25)	0.35†
Last sex/male when had last sex with a male (n=304)					
≤3 months	24 (15.7)	126 (82.3)	3 (2.0)	1	
>3 months	29 (26.6)	74 (67.9)	6 (5.5)	1.95 (1.02 to 3.74)	
Never	7 (16.7)	31 (73.8)	4 (9.5)	1.08 (0.38 to 2.91)	0.32†
Past sex/male when had sex with a different male partner (n=159, Heterosexuals asked only)					
≤3 months	6 (19.4)	251 (80.6)	0	1	
>3 months	16 (12.8)	106 (84.8)	3 (2.4)	0.61 (0.20 to 1.96)	
Never	1 (33.3)	2 (66.7)	0	2.08 (0.0 to 39.55)	0.62†
Male partners lifetime number of male partners (n=328)					
None	7 (16.7)	31 (73.8)	4 (9.5)	1	
1–5	31 (21.4)	106 (73.1)	8 (5.5)	1.36 (0.51 to 3.72)	
6–10	15 (20.8)	56 (77.8)	1 (1.4)	1.32 (0.45 to 3.99)	
11+	13 (18.8)	55 (79.7)	1 (1.4)	1.16 (0.38 to 3.60)	0.98†
Last sex/female when had last sex with a female (n=320)					
≤3 months	27 (22.9)	84 (71.2)	7 (5.9)	1	
>3 months	6 (21.4)	22 (78.6)	0	0.92 (0.30 to 2.72)	
Never	26 (15.3)	138 (81.2)	6 (3.5)	0.61 (0.32 to 1.15)	0.10†
Past sex/female when had sex with a different female partner (n=118, lesbians asked only)					

Table 2 (Continued)

	Women with BV (n = 70) (%)	Women with normal flora (n = 270) (%)	Women with intermediate flora (n = 14) (%)	Univariate OR normal + intermediate vs BV (95% CI)	p Value
≤ 3 months	5 (33.3)	10 (66.7)	0	1	0.63†
> 3 months	30 (29.4)	66 (64.7)	6 (5.9)	0.83 (0.23 to 3.09)	
Never	0	1 (100.0)	0	–	
Female partners lifetime number of female partners (n = 344)					0.004†
None	26 (15.3)	138 (81.2)	6 (3.5)	1	
1–5	21 (20.2)	79 (76.0)	4 (3.8)	1.40 (0.71 to 2.77)	
6–10	11 (28.2)	26 (66.7)	2 (5.1)	2.18 (0.89 to 5.26)	
11+	11 (35.5)	18 (58.1)	2 (6.5)	3.05 (1.20 to 7.67)	
Contraception (n = 169, heterosexuals asked only)					–
Non-hormonal or no contraception	13 (15.9)	67 (81.7)	2 (2.4)	1	
Hormonal contraception	11 (12.6)	74 (85.1)	2 (2.3)	0.77 (0.30 to 1.98)	

p < 0.05 in bold. *Fisher's exact test; χ^2 except where † χ^2 for trend; ‡reference category is non-smoker; §reference category is no receptive oral sex.

There was a significant association between report of abnormal odour and BV. This gives further support to the consideration of malodorous discharge as a useful adjunct to the usual clinical criteria for BV diagnosis.²² We did not find a similar association with report of discharge.

Smoking significantly increased the risk of BV regardless of sexuality, with a dose-response relationship to number of cigarettes smoked per day. This has been a consistent finding in other studies.^{16–20, 23} The mechanism behind this is unknown but it has been postulated that this may be because of vaginal accumulation of amines.²⁴

Interestingly, the use of bubble bath (as opposed to antiseptic use in the bath or on the vulva or vaginal douching) was associated with less BV, unlike a previous study where its vulval use was significantly more common in women with BV.¹¹ We are unable to explain this finding, which may be due to chance.

There was no significant association between contraceptive method and BV in heterosexuals. Hormonal methods of contraception have been reported as being protective against BV,^{19, 20} perhaps by reduction in menstrual blood flow or alteration in the hormonal milieu, and hence may confound effects on flora in groups with differing contraceptive use.

We found concordance of vaginal flora in 87% of the lesbian partnerships. This high level of concordance has been described in two previous studies.^{3–6} One study found concordance in 43% of partnerships³ and the other in 95%.⁶ Both of these studies defined concordance as the presence of BV or absence of BV in both partners; hence, we too used this definition. We also found concordance of smoking habit in 80% of these lesbian partnerships; hence, concordant flora may be explained by common habits or risk factors that are unaccounted for or underestimated due to sample size. Alternatively, this may support the hypothesis of a sexually transmissible factor that is

postulated to be transmitted by exchange of vaginal secretions. We feel that further research into this, and the effects of smoking on the vaginal environment, is required.

Our study has several important limitations that must be considered. We used convenience sampling so the study is prone to volunteer bias. Sampling frame issues may be particularly important for our lesbian cohort, as those lesbian women attending gay venues and events may comprise a subgroup that is not representative of the lesbian population as a whole.

As the questionnaires were self-completed, good literacy skills were required. The study relied on recall, and reporting bias on sexual behaviour is well recognised.²⁵ Item non-response is also a potential source of bias. However, the benefits of using self-completed questionnaires about disclosure of sensitive information, including homosexual experience, have been shown.⁷

Differences between sexual identity and sexual behaviour must be appreciated when ascribing the sexuality of individuals. In our study, women had to choose between the rather crude categories of lesbian or heterosexual and heterogeneity of sexual behaviour and experience was clearly seen within these two groups. Three-quarters of the lesbian women had male partners at some time, in keeping with findings in previous studies.^{2–5, 6, 26} The maximum lifetime number of male partners reported was higher in the lesbian than heterosexual group, which may reflect higher-risk sexual behaviour in some bisexual women as previously reported in sex surveys.^{7, 8} However the number of lesbians reporting 11+ male lifetime partners was small and the median male partner number was less than for heterosexuals. It would not, therefore, seem likely that any excess BV risk in the lesbian group is ascribable to

Table 3 Logistic regression model (n = 311): significant variables independently associated with bacterial vaginosis in bold

Variable	Adjusted OR (95% CI)	p Value
Lesbian sexual identity	2.45 (1.25 to 4.82)	0.009
Smoking	2.65 (1.49 to 4.72)	0.001
Bubble bath use	0.49 (0.27 to 0.88)	0.02
Age (per additional year)	0.97 (0.92 to 1.02)	0.20
Non-Caucasian ethnic group	1.98 (0.84 to 4.68)	0.12

Key messages

- Prevalence of bacterial vaginosis (BV) was significantly greater in lesbian (25.7%) than heterosexual (14.4%) volunteers in this community-based convenience sample.
- Smoking was independently associated with BV.
- Concordance of vaginal flora in lesbian partnerships may support the hypothesis of a sexually transmitted factor or may reflect common risk factors such as smoking.

excess male partner numbers in few bisexual women. Finally, no association between flora and male partner number was seen in our study.

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CONTRIBUTORS

JDW designed the study and graded slide results with ALE; ALE coordinated the study, recruited the patients and drafted the manuscript; SW collated the data, recruited patients and coordinated slide blinding; AJS, ALE and JDW performed the data analyses; all authors reviewed and approved the final paper.

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