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Risk factors for bacterial vaginosis during pregnancy among African-American women

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OVERVIEW

In a prospective cohort study, we examined risk factors for bacterial vaginosis during pregnancy among African-American women.

Background and Objective

Bacterial vaginosis (BV), the most common vaginal condition, is often described as an imbalance of normal vaginal flora. BV is characterized by an overgrowth of anaerobic bacteria, resulting in the reduction of hydrogen peroxide-producing lactobacilli. The condition has been widely implicated as a risk factor for preterm delivery, low birthweight, and other complications of pregnancy.

The reported prevalence of BV during pregnancy ranges from 4.9% to 49%. The prevalence of BV among pregnant and nonpregnant populations depends on the clinical setting, sociodemographic factors, diagnostic criteria, gestational age, and other factors. In a number of studies, BV rates for pregnant and nonpregnant women are higher among black than white women even after identified confounders have been accounted for. However, vaginal douching, a potential risk factor that is practiced much more often by black women than by white women, was seldom controlled for in these studies.

Psychosocial stress and perceived life stress have recently been added to the list of suspected risk factors for BV. We hypothesized that stress might affect the immune system and increase susceptibility to BV, as demonstrated for the common cold and other markers of immune system function.

We recently collected data on a wide range of risk factors hypothesized to relate to preterm birth in a low-income African-American prenatal cohort. These risk factors included detailed data on vaginal douching practices, sexual behavior, and factors related to stress as well as BV prevalence in the second trimester. In examining data for women enrolled at 22–28 weeks' gestation and who provided a vaginal specimen, we explored a number of social and behavioral factors that may relate to BV prevalence during pregnancy in a low-income African-American

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population. This process enabled us to adjust for important confounders of the hypothesized associations.

Materials and Methods

Participants were enrolled as part of a study of preterm birth among African-American women. Women were approached for enrollment if they were receiving prenatal care at 1 of 3 Johns Hopkins Medical Institutions clinics or if they had delivered at Johns Hopkins Hospital after receiving late or no prenatal care. Interview data were collected on 872 women over approximately 3 years (March 2001 through July 2004), with a response rate of 68%.

Women were enrolled either prenatally (at 22-28 weeks' gestation) or postnatally. Only those enrolled prenatally were asked to provide a vaginal smear specimen upon enrollment and were included in the subsequent analysis ($n = 485$). The primary purpose of enumerating the cohort was to study preterm birth among the study population in an analysis focusing on BV ascertained during pregnancy.

Vaginal smears were Gram stained and scored using Nugent's method, with a score of ≥ 7 considered BV positive. Comparison subjects were women whose Nugent score was ≤ 6 .

Data regarding race/ethnicity, age, education, employment, locus of control, social support, anxiety, stress, smoking, and alcohol and drug use were collected in a prenatal interview conducted in person at the prenatal care site. For women who reported douching, we asked whether they had douched, and if so, how often, 6 months before pregnancy and during pregnancy. In the postpartum interview, we asked women about their sexual history, including lifetime number of partners, age at first intercourse, and frequency of intercourse during each trimester of pregnancy.

Results

All study subjects were African-American, relatively young (mean age, 22.8; SD, 5.25), and of low socioeconomic status. Approximately half of the study sample reported not having smoked during the 6 months before the index pregnancy or during that pregnancy.

Approximately one-half of respondents reported a history of reproductive tract infection; 43% reported a history of a sexually transmitted infection. Almost 16% reported having sexual intercourse [authors: OK? OK] at least once a week during the first trimester of the current pregnancy; 28% reported intercourse [authors: OK? OK] more frequently during the same time period.

Vaginal douching was the most common feminine hygiene practice. Almost 54% of the sample reported having douched during the 6 months before the index pregnancy. A small number ($n = 24$) also douched during the index pregnancy.

Among all women enrolled prenatally ($n = 485$), vaginal smear specimens were available for 438. Of these, 25% (110/438) were positive for BV.

No statistically significant associations were identified between BV and variables measuring maternal education, cost of housing, public housing rental, social support, anxiety, stress, history of smoking before or during the index pregnancy, lifetime number of sexual partners, use of powders or sprays, or history of reproductive tract infections or sexually transmitted infections.

After we had adjusted for confounders in multivariable analyses (Table), vaginal douching during pregnancy remained significantly associated with increased likelihood of BV in the

second trimester. In addition, greater frequency of intercourse during the first trimester of pregnancy was significantly associated with an increased likelihood of BV during the second trimester. Some factors that lacked independent associations with BV during pregnancy remained important confounders and were therefore retained in the final model.

Comment

In this study of pregnant low-income African-American women, we observed a BV prevalence of 25%. This figure is slightly higher than, but consistent with, the prevalence observed for minority women in a previous population-based study of BV during pregnancy. While risk factors for BV may indeed be similar for pregnant and nonpregnant women, pregnancy is a state of tremendous physiologic change that could plausibly influence the effects of exposure on BV risk. Because our sample was exclusively African-American and nearly all women were unmarried and of low income, we cannot effectively examine these risk factors.

Women who douched during pregnancy were significantly more likely to have BV than those who did not douche during pregnancy. No increase in risk was seen in women with more distant douching exposures (ie, >6 months before the index pregnancy or only 6 months before the pregnancy but not during it). Unfortunately, we did not have first-trimester ascertainment of BV, a time point closer to these exposures. The literature on an association between douching and BV in pregnancy is limited.

Because longitudinal data on BV linked to douching practice are lacking, we are limited in our inferences about the relationship between BV and douching. It is unclear whether douching is a cause of BV or a consequence of it. Untangling this relationship will require the collection of longitudinal measures of both BV and vaginal douching before and during pregnancy.

In the literature on nonpregnant women, longitudinal research supports a role for douching in BV. Nevertheless, this connection may not apply during pregnancy, a time of dramatic changes in hormones and other factors that may influence susceptibility to BV. Longitudinal analyses of douching and BV in the context of pregnancy will need to further explore “lag times” (eg, 1 week, 1 month) and determine whether the effects of douching are modified by the gestational time period as physiologic parameters change throughout gestation.

Our results do not support a relationship between any of the variables we measured related to stress or to psychosocial or social factors [authors: OK? OK] and BV prevalence during pregnancy in low-income African-American women. A major strength of our study was the collection of data on a large number of known and suspected risk factors for BV in addition to a wide range of social and behavioral characteristics that had not previously been identified as risk factors for BV.

The focus on African-American women, a group known to be at increased risk for preterm birth as well as more likely to have BV and to engage in douching, is an additional strength of this study. The study of these issues in high-risk populations may uncover different patterns of risk than studies of lower-risk women or more heterogeneous groups of women.

Our study has several limitations. First, we collected only lifetime number of sexual partners, but not information regarding the number of partners during time periods of relevance to the BV specimen. While we asked about sexual intercourse during pregnancy, we did not ask about intercourse immediately before the specimen was collected (eg, 1 week or 1 month prior). Second, as discussed earlier, the lack of longitudinal repeated measures of BV, despite the measurement of douching during multiple time periods, limits our inferences.

Finally, predictors of BV within a subset of women who sought prenatal care may be different from risk factors for populations who could not or would not seek prenatal care. This limitation is difficult to overcome because doing so would require recruiting pregnant women for study in venues other than clinical sites.

CLINICAL IMPLICATIONS

- Risk factors for bacterial vaginosis (BV) during pregnancy are inconsistent, underreported, and often overlooked.
- Vaginal douching and frequent intercourse during pregnancy may increase risk for BV during pregnancy.
- Clinicians who treat women of reproductive age should understand the risk factors, symptoms, and potential sequelae of BV.

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Table 1

Descriptive characteristics for the 438 African American women in the study sample

	No. Women	% BV+*	Unadjusted Log-Binomial Regression	
	n	% (n)	RR	95% CI
<i>Total Sample</i>	438	25.1 (110)		
<i>Age</i>				
12-19 year olds	120	17.5 (21)	0.63	(0.41, 0.96) [†]
Over 19	318	28.0 (89)	1.00	Reference
<i>Education:</i>				
Less than 12 years of school, less than 21 years old	154	20.8 (32)	1.39	(0.62, 3.08)
Less than 12 years of school, 21 years old or older	244	29.5 (72)	1.97	(0.92, 4.22)
Greater than 12 years of school	40	15.0 (6)	1.00	Reference
<i>Monthly Rent</i>				
\$250 or less	137	26.3 (36)	1.24	(0.76, 1.99)
\$251-550	180	27.2 (49)	1.28	(0.81, 2.02)
\$551 or greater	94	21.3 (20)	1.00	Reference
<i>Do you live in Public Housing?</i>				
Yes	183	27.9 (51)	1.20	(0.84, 1.72)
No	177	23.2 (41)	1.00	Reference
<i>Did you smoke in the 6 months before pregnancy or during the first trimester?</i>				
Never smoked	300	23.7 (71)	1.00	Reference
Smoked 6 mos. before pregnancy only	22	18.2 (4)	0.77	(0.31, 1.91)
Smoked 6 mos. before and /or during 1 st trimester	115	29.6 (34)	1.25	(0.88, 1.77)
<i>Social Support</i>				
Above median (high social support)	242	23.6 (57)	0.87	(0.63, 1.20)
Below median (low social support)	196	27.0 (53)	1.00	Reference
<i>Anxiety</i>				
Top quartile (high stress)	193	24.9 (48)	0.95	(0.68, 1.33)
Bottom three quartiles (moderate to low stress)	198	26.3 (52)	1.00	Reference
<i>Hassles</i>				
Top quartile (high stress)	217	25.8 (56)	1.11	(0.80, 1.55)
Bottom three quartiles (moderate to low stress)	216	23.2 (50)	1.00	Reference
<i>Frequency of intercourse during 1st trimester of index pregnancy</i>				
Never or less than once per month	92	19.6 (18)	1.00	Reference
1-3 times per month	110	23.6 (26)	1.21	(0.71, 2.06)
Once per week	69	26.1 (18)	1.33	(0.75, 2.37)
More than once per week	124	31.5 (39)	1.61	(0.99, 2.62)
<i>Lifetime number of partners</i>				
1-3 men	113	23.9 (27)	1.00	Reference
4-10 men	218	27.5 (60)	1.15	(0.77, 1.70)
11 or more	36	22.2 (8)	0.91	(0.46, 1.79)
<i>Vaginal Douching:</i>				
Never	125	18.4 (23)	1.00	Reference
Ever [‡]	99	27.3 (27)	1.48	(0.91, 2.42)
Douched 6 mos. prior to pregnancy				
Less than 3 times per month	174	25.3 (44)	1.37	(0.88, 2.15)
3 times per month or more	15	40.0 (6)	2.17	(1.06, 4.47) [†]
During pregnancy [§]	24	37.5 (9)	2.04	(1.08, 3.85) [†]
<i>History of reproductive tract infection</i>				
Yes	211	28.0 (59)	1.24	(0.90, 1.71)
No	226	22.6 (51)	1.00	Reference
<i>History of sexually transmitted infection</i>				
Yes	181	27.1 (49)	1.14	(0.82, 1.57)
No	256	23.8 (61)	1.00	Reference
<i>Feminine spray, wash or towelettes to clean private areas:</i>				
During 6 months before pregnancy	154	26.1 (45)	1.06	(0.70, 1.59)
<i>Talcum, baby or deodorizing powder on private areas after bathing</i>				
During 6 months before pregnancy	92	29.2 (24)	1.26	(0.90, 1.78)

* Percent of women within each strata with a vaginal specimen positive for bacterial vaginosis (BV)

[†] p=.05[‡] Ever douching includes women who reported ever douching, but did not douche during pregnancy or 6 months prior to pregnancy[§] During pregnancy includes women who douched both 6 months before and during pregnancy

Table II
Predictors of bacterial vaginosis during the 2nd trimester of pregnancy (22-28 weeks gestation)

Variable	Adjusted Log-Binomial Regression [*]	
	RR	95% CI
<i>Vaginal Douching:</i>		
Never	1.00	Reference
Ever [†]	1.53	(0.91, 2.56)
Douched 6 mos. prior to pregnancy		
Less than 3 times per month	1.48	(0.92, 2.37)
3 times per month or more	1.82	(0.76, 4.37)
During pregnancy [‡]	2.17	(1.10, 4.28) [§]
<i>Frequency of intercourse during 1st trimester</i>		
Never or less than once per month	1.00	Reference
1-3 times per month	1.27	(0.74, 2.19)
Once per week	1.45	(0.81, 2.61)
More than once per week	1.69	(1.03, 2.77) [§]

* Adjusted for covariates listed as well as age, social support, and history of sexually transmitted infection

[†] Includes women who reported ever douching, but did not douche during pregnancy or 6 mos. prior to pregnancy

[‡] Includes women who douched both 6 months before and during pregnancy

[§] p=.05