Prevalence of Bacterial Vaginosis in Thai Women attending the Family Planning Clinic, Siriraj Hospital

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Objectives : *To investigate the prevalence of bacterial vaginosis (BV) among Thai women attending a family planning clinic and to evaluate the association of BV with potential risk factors.*
Material and Method : *A cross sectional prevalence study was conducted among 800 women attending the family planning clinic, Siriraj Hospital, between August and December 2003. BV was diagnosed according to Amsel's criteria. Prevalence and risk factor models were compiled and statistically analyzed.*
Results : *Among the low risk population acquiring sexually transmitted diseases, the prevalence of BV was 14.6% (117 of 800). Asymptomatic disease was recognized in up to 47.9% (56 of 117). BV was significantly more prevalent among those who used douching inside the vagina [OR = 3.98 (1.85-8.33), p < 0.01] and high a prevalence among IUD users [OR = 1.84 (1.22-2.79), p < 0.01]. Although not statistically significant, BV tended to be more prevalent among women with a lower age at first intercourse, higher numbers of lifetime partners, higher frequency of sexual intercourse and current smokers.*
Conclusion : *BV is a relatively high prevalent condition. The two potential risk factors, douching inside the vagina and IUD use, can be demonstrated, adding to be more concerned about the inappropriate practice of douching and more consideration in IUD users. The other potential risk factors, the impact to adverse reproductive outcomes and the prevention of BV need further studies, particularly in various Thai populations.*

Keywords : *Bacterial vaginosis, Prevalence, Risk factor*

J Med Assoc Thai 2004; 87(12): 1419-24
Full text. e-Journal: *http://www.medassocthai.org/journal*

Bacterial vaginosis (BV) is a clinical syndrome resulting from replacement of the normal H_2O_2 - producing *Lactobacillus sp*. in the vagina with high concentrations of anaerobic bacteria (e.g. *Bacteroides* sp., *Prevotella* sp., and *Mobiluncus* sp.), *Gardnerella vaginalis*, and *Mycoplasma hominis*[1]. Available studies have shown its association with a number of important obstetric and gynecologic complications including premature rupture of the fetal membranes, chorioamnionitis, preterm labor and delivery, post-cesarean delivery endometritis, postpartum complications in the infant, post-abortion endometritis, nonchlamydial/ nongonococcal pelvic inflammatory disease and risk of acquiring HIV infection[2].

The etiology of BV has been under debate. It is convincingly associated with several risk factors e.g. higher numbers of sexual partners, lower age of first intercourse, previous history of a sexually transmitted disease, having a new sexual partner, vaginal douching, smoking and using an intrauterine device (IUD)[3].

The absolute prevalence of BV varies considerably in populations studied e.g. 18% of women attending genitourinary clinics, 24-37% of women attending sexually transmitted disease (STD) clinics and 5-21% of women attending antenatal clinics[3,4]. In Thailand, only two studies have found a prevalence

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of 33% in female sex workers[5] and 16% in pregnant women[6]. The present study, therefore, was conducted to investigate the prevalence of BV among Thai women attending a family planning clinic and to evaluate the association of BV with potential risk factors.

Material and Method

This prevalence study was included 800 women attending the family planning clinic, Siriraj Hospital, between August and December 2003. Participants were excluded from the study if they were menstruating or having vaginal bleeding, pregnant, using any vaginal suppository drug, previously diagnosed with human immunodeficiency virus (HIV) infection, having a visible vaginal or cervical mass suspected to be cancer and within six weeks of postabortion or postpartum.

After informed consent was obtained, the participants underwent a standardized interview to obtain demographic characteristics, sexual behaviors, current contraceptive use and any current genital symptoms. Then, pelvic examination was conducted for each participant. An unlubricated speculum was inserted into the vagina and vaginal secretion was evaluated for the appearance. Samples of vaginal secretion were obtained with two dry cotton-tipped swabs from the vaginal fornices. Vaginal pH was measured directly from one of the swabs, using an indicator paper (Merck, Germany: range 4.0-6.0), then this swab was mixed into two drops of 10% potassium hydroxide on a glass slide and tested for the fishy amine-like odor. Another swab was mixed into two drops of normal saline solution in a test tube, which was subsequently examined for the presence of clue cells and other vaginal infections such as trichomoniasis and candidiasis. A third swab was inserted into the endocervical canal to obtain cervical secretion, then smeared on a glass slide for gram stains and examined microscopically for polymorphonuclear cells and intracellular gram-negative diplococci, characterized of *Neisseria gonorrhoeae*. BV was diagnosed by the presence of at least three of four findings according to Amsel et al[7]: 1) Thin, homogeneous appearing vaginal discharge, 2) vaginal pH of greater than 4.5, 3) release of a fishy amine odor on addition of 10% potassium hydroxide or positive whiff test, and 4) presence of vaginal epithelium cells heavily coated with small bacilli (clue cells) on a saline wet mount.

Data were analyzed by SPSS for windows version 10.0 and Epi Info version 6. Comparison between groups was performed by using the Chi-square test or Fisher's exact test for categorical variables and the Student's *t* test for continuous variables. Odds ratios and 95% confidence intervals were also calculated. Values of $p < 0.05$ were considered statistically significant.

Results

During the study period, 800 consecutive women attending at family planning clinic, Siriraj Hospital, were recruited. The demographic characteristics of the study population are shown in Table 1. The mean age was about 35 years (range 15-67), the great majority (96.1%) were married and cohabiting. Only 2.8% were current smokers, 0.9% reported a prior history of sexually transmitted diseases and 0.6% had had more than 2 sexual partners in the past 3 months. Nearly 90% had only a single sexual partner through their lifetime and about 60% reported having 1 or less sexual intercourse per week. The distribution of contraceptive methods is also shown in Table 1.

The overall prevalence of bacterial vaginosis according to the Amsel's criteria was 14.6% (117 of 800) and asymptomatic disease was recognized in up to 47.9% (56 of 117), as shown in Table 2. The most com-

Table 1. Characteristics of 800 women enrolled in the study

Characteristics	N	%
Age (mean ± SD) (years)	35.27±9.79	
Marital status		
Single	15	1.9
Married with cohabiting	769	96.1
Divorced/separated/widowed	16	2.0
Education		
Elementary or lower	375	46.9
High school or higher	425	53.1
Occupation		
Employee/Agriculturist	329	41.1
Housewife	271	33.9
Own business/Bureaucrat	200	25.0
Gravidity		
0/1	327	40.9
≥ 2	473	59.1
Current smokers	22	2.8
Prior STD history	7	0.9
≥ 2 partners in past 3 month	5	0.6
≥ 2 Lifetime partners	103	12.9
Sexual intercourse ≤ 1 time/week	471	58.9
Current contraceptive use		
Hormonal contraceptive use	335	41.8
Intrauterine device	328	41.0
Tubal sterilization	86	10.8
Male condom	20	2.5
No contraceptive use	31	3.9

Table 2. Symptoms and other infections of the population

	BV present N = 117		BV absent N = 683		p-value
	n	%	n	%	
Symptoms					
No symptom	56	47.9	353	51.7	0.48
Increased discharge	48	41.0	225	67.1	0.09
Vaginal malodor	32	27.4	98	14.3	<0.01*
Increase malodor after intercourse	23	19.7	42	6.1	<0.01*
Vaginal itching	25	21.4	122	17.9	0.37
Vaginal irritation	10	8.5	70	10.2	0.74
Vaginal dyspareunia	19	16.2	108	15.8	0.89
Other infections					
Candidiasis	3	2.6	88	12.9	<0.01*
Trichomoniasis	2	1.7	6	0.9	0.33
Gonorrheal infection	0	0	1	0.1	1.00
Endocervical PMN ≥ 10/HPF	26	22.2	145	21.3	0.98

* Statistical significance

mon complaint of either groups was increased vaginal discharge, whereas vaginal malodor and increase malodor after intercourse were significantly associated with bacterial vaginosis.

There was a statistically significant difference in the prevalence of candidiasis, detected by microscopic examination, in women with bacterial vaginosis (2.6%; 3 of 117) and normal women (12.9%; 88 of 683) ($p < 0.01$). Nevertheless, bacterial vaginosis was not significantly associated with endocervicitis, defined as ≥ 10 polymorphonuclear cells per 1000x field on gram stains, nor with trichomoniasis or gonorrheal infection.

No significant association was demonstrated between bacterial vaginosis and age, menopausal status, days since last menstrual period, days since last sexual intercourse and prior history of sexual transmitted diseases (Table 3). Although not statistically significant, bacterial vaginosis tended to be more prevalent among women with a lower age at first intercourse, higher numbers of lifetime partners, higher frequency of sexual intercourse, current smokers, and less prevalence among women with current antibiotic use. However, bacterial vaginosis was significantly more prevalent among women who used douching inside the vagina than those who never douched [OR = 3.98 (95%CI 1.85-8.33), $p < 0.01$], and significantly more prevalent among women using IUD than non-IUD users [OR = 1.84 (95%CI 1.22-2.79), $p<0.01$] (Table 3). There was no significant association between BV and IUD use, compared with tubal ligation and no contraceptive use [OR=1.8 (95%CI 0.98-3.47), p=0.07], as well as hormonal contraceptive use, compared in the same fashion [OR=0.97 (95%CI 0.5-1.9), p=0.95]

Discussion

The prevalence of BV varies considerably and depends on features of studied populations, varying proportions of women perceiving abnormal vagi-

Table 3. Selected factors potentially associated with BV

Characteristics	BV present N = 117	BV absent N = 683	OR (95% CI)+	p-value
	n (%)	n (%)		
Age ≤ 25 years	21 (17.9)	132 (19.3)	0.91 (0.52-1.54)	0.72
Premenopause	113 (96.6)	648 (94.9)	1.53 (0.53-6.02)	0.43
Menses within last 14 days	40 (34.2)	218 (31.9)	1.11 (0.71-1.71)	0.63
Last sexual intercourse ≤ 48 hours	25 (21.4)	121 (17.7)	1.26 (0.76-2.10)	0.34
Prior STD history	1 (0.9)	6 (0.9)	0.97 (0.02-8.13)	1.00
Age at first intercourse ≤ 20 years	73 (62.4)	370 (54.2)	1.40 (0.92-2.15)	0.09
≥ 2 Lifetime partners	20 (17.1)	83 (12.2)	1.49 (0.83-2.59)	0.14
≥ 2 partners in past 3 months	1 (0.9)	4 (0.6)	1.46 (0.03-14.95)	0.55
Sexual intercourse > 1 time/week	45 (38.5)	284 (41.6)	0.88 (0.57-1.34)	0.53
Current smokers	6 (5.1)	16 (2.3)	2.25 (0.71-6.22)	0.12
Current antibiotic use	6 (5.1)	50 (7.3)	0.68 (0.23-1.65)	0.39
Use of vaginal douching	35 (29.9)	182 (26.6)	1.17 (0.74-1.84)	0.46
-Duration (mean ± SD) (months)	21.1±23.0	23.8±28.1		0.29
-Frequency ≥ 1 time/week	26 (22.2)	152 (22.2)	1.05 (0.62-1.71)	0.86
-Douching inside vagina	15 (12.8)	23 (3.4)	3.98 (1.85-8.33)	<0.01*
-Recent use (≤ 48 hours)	18 (15.4)	120 (17.6)	0.92 (0.5-1.61)	0.75
Current IUD use	63 (53.8)	265 (38.8)	1.84 (1.22-2.79)	<0.01*

+ CI = confidence interval, * Statistical significance

nal discharge and diagnostic methods[4,8]. The present study, conducted in a family planning clinic of a low risk population for acquiring sexually transmitted diseases, found the prevalence of BV according to clinical Amsel's criteria was 14.6%. This is comparable to the study from a Thai antenatal population[6], and of course, is lower than the population of Thai commercial sex workers[5].

Although BV had typical symptoms of vaginal malodor and increased malodor after intercourse as the authors and previous studies[3,7] found correspondingly, only 27.4% and 19.7% of women diagnosed as having BV, presented with these symptoms, respectively. Women with BV might report any vaginal symptoms and nearly up to 50% of those were asymptomatic. Therefore, the authors suggest that women considered to be at high risk of having BV should be targeted, either asymptomatic or atypical presentations.

Previous studies have examined women with BV for the general risk factors that characterize sexually transmitted diseases including lower age of sexual debut, higher numbers of lifetime partners, higher rates of partners change and having a history of bacterial sexual transmitted infections[9,10]. However, BV demonstrates a contrasting age profile that being most prevalent among those aged over 25[10,11]. The present findings found no correlation of the prevalence of BV to age, consistent with previous studies[8,12]. Furthermore, although lower age of sexual debut, higher numbers of lifetime partners and higher frequency of sexual intercourse tended to be more common among women with BV, the authors failed to demonstrate the statistical significance. It is possible that the numbers of the studied population were not enough to yield the power of significance, or else BV, particularly in the presented population, was not strongly associated with high risk sexual behavior, as in previous studies which revealed that BV might occur in either virgins[7,13], or divorced women[10] and even lesbians, determined as low rate for sexual transmitted diseases[3,4]. Therefore, factors other than sexual activity may be important in the development of BV.

Vaginal douching that has been shown by other studies as an independent risk factor of BV, depends on several factors such as frequency of douching, recentness, reasons for douching, preparations of solutions and douching patterns (vulva or inside the vagina)[14,15]. Ness et al[14] demonstrated that douching at least once per month, recent douching within 7 days and douching for symptoms or hygiene was associated with BV. Rajamanoharan et al[15] demonstrated the significant association to the applications of commercial antiseptic products to vulval mucosa, even without douching inside vagina. The present study demonstrated only douching inside the vagina was significantly associated with BV, regardless of douching frequency, recentness and even duration of use. The douching preparations in the present study were not defined, as described in previous studies that different douching solutions have different antibacterial effect such as antiseptic douches which inhibit all vaginal microorganisms including lactobacilli, whereas commercial douches containing mostly vinegar and water inhibited pathogens but not lactobacilli[14,16], therefore this interesting issue should be confirmed.

Concerning contraceptive methods, the association between IUD use and BV has been unclear. Some studies reported an increase risk of BV in IUD users, with the explanation that IUD might change the vaginal flora in favor of the growth of bacteria associated with BV and should be screened prior to IUD insertion[17-19], but others reported no association[11,20]. The present study found that IUD use significantly increased the risk of BV when compared with other methods, mostly hormonal contraceptives, the methods undisputedly identified to decrease the risk of BV, although no satisfactory mechanism has been described[17,20,21]. Therefore, when compared with tubal ligation and non-contraceptive users, methods that are likely to have no risk for changing vaginal flora, IUD seemed to increase the risk of BV but not significantly. This possibly reveals no actual association between IUD and BV, otherwise the limitations of the present cross-sectional study need further well-controlled studies to explain the issue.

Those presenting with BV were less likely to have a fungal infection, as shown in the present study. This is consistent with others[10,22] that have explained an inhibitory effect of BV-produced amines on the fungal multiplication. Correlations of BV with other genital tract infections e.g. *Trichomonas vaginalis, Chlamydia trachomatis* and *Neisseria gonorrhoeae* have been described by others[7,10,14,22]; however, the small numbers of infected cases limited the conclusions. Even though cervicitis might alter the consistency, appearance, or pH of vaginal fluid, which were consistent with Amsel et al[7], demonstrated no significant difference on the proportion of those diagnosed BV.

In summary, the results showed a relatively high prevalence of BV among Thai women attending a family planning clinic. The two potential risk fac-

tors, douching inside the vagina and IUD use, can be demonstrated, adding to be more concerned about the inappropriate practice of douching and more considered in IUD users. However, the present study reinforces the need for more well-controlled researches on the relationship between BV and various potential risk factors, and the impact, including the prevention, of this detrimental vaginal flora change to adverse reproductive outcomes, particularly in various Thai populations.

Acknowledgement

The authors wish to thank all family planning clinic staff for their dedication in collecting data, Dr. Dittakarn Boriboonhirunsarn, MD for suggestions in the statistical analysis and finally, all the women whose participation contributed to the success of this study.

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การศึกษาความชุกของภาวะแบคทีเรียลวาไจโนสิสในสตรีไทย ณ คลินิกวางแผนครอบครัว โรงพยาบาลศิริราช

วิเศษฐ วัชโรทน, กรกฎ ศิริมัย, อรวรรณ คีรีวัฒน์, พันธิปภา นุกูลการ, อุษณีย์ วัชรประภาพงศ์, สุรัตน์ พิบูลย์มณี, สมถวิล จันทนะโพธิ, เนตรอนงค์ เล็กยิ้ม, เกศสุดา จิรวัชรเดช

วัตถุประสงค์ *: เพื่อศึกษาความชุกของภาวะแบคทีเรียลวาไจโนสิส และความสัมพันธ์ระหว่างภาวะแบคทีเรียลวาไจโนสิสกับปัจจัยเสี่ยงต่างๆ ในสตรีไทย ณ คลินิกวางแผนครอบครัว*

วิธีการศึกษา *: การศึกษาแบบตัดขวางในสตรี จำนวน 800 ราย ซึ่งได้เข้ามารับการตรวจ ณ คลินิกวางแผนครอบครัว โรงพยาบาลศิริราช ระหว่างเดือนสิงหาคม ถึง เดือนธันวาคม พ.ศ.2546 การวินิจฉัยภาวะแบคทีเรียลวาไจโนสิสใช้เกณฑ์วินิจฉัยของ Amsel ความชุกและรูปแบบของปัจจัยเสี่ยงต่างๆ ได้รับการรวบรวมและวิเคราะห์ทางสถิติ*

ผลการศึกษา *: ในกลุ่มประชากรที่มีความเสี่ยงต่ำต่อการได้รับโรคติดต่อทางเพศสัมพันธ์นี้ พบความชุกของภาวะแบคทีเรียลวาไจโนสิส 14.6% (117 คนจาก 800 คน) โดยไม่มีอาการของโรคถึง 47.9% (56 คนจาก 117 คน) ความชุกของภาวะแบคทีเรียลวาไจโนสิสพบมากขึ้นอย่างมีนัยสำคัญทางสถิติในกลุ่มที่มีการใช้น้ำยาสวนล้างในช่องคลอด [OR = 3.98 (1.85-8.33), p<0.01] และกลุ่มที่ใส่ห่วงอนามัย [OR = 1.84 (1.22-2.79), p<0.01] ส่วนในสตรีที่มีเพศสัมพันธ์ครั้งแรกตั้งแต่อายุน้อย มีคู่นอนหลายคน มีเพศสัมพันธ์บ่อยครั้งและสูบบุหรี่ พบว่าความชุกของภาวะแบคทีเรียลวาไจโนสิสมีแนวโน้มสูงขึ้นด้วยเช่นกัน แต่ไม่มีนัยสำคัญทางสถิติ*

สรุป *: ภาวะแบคทีเรียลวาไจโนสิสเป็นภาวะที่มีความชุกค่อนข้างสูง โดยพบปัจจัย 2 ประการที่น่าจะเป็นปัจจัยเสี่ยงคือ การใช้น้ำยาสวนล้างในช่องคลอดและการใส่ห่วงอนามัย ทำให้ต้องตระหนักมากขึ้นถึงการกระทำที่ไม่เหมาะสมเกี่ยวกับการใช้น้ำยาสวนล้างช่องคลอด และควรเฝ้าระวังมากขึ้นในกลุ่มที่ใส่ห่วงอนามัย ส่วนปัจจัยอื่น ๆ ที่อาจเป็นปัจจัยเสี่ยง รวมทั้งผลเสียต่อสุขภาพอนามัยการเจริญพันธุ์ และการป้องกันภาวะแบคทีเรียลวาไจโนสิส ควรได้รับการศึกษาต่อไป โดยเฉพาะในกลุ่มต่าง ๆ ของประชากรไทย*