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URINARY TRACT INFECTIONS IN WOMEN WITH BACTERIAL VAGINOSIS: A PREVALENCE STUDY IN TERTIARY CARE CENTRE

Urology

Dr Deepak Kumar Classified Specialist (Surgery) & Urologist, Command Hospital (Western Command), Chandimandir, Haryana

Dr Namita Gupta* Consultant (Obstetrics and Gynaecologist), GMSH, Sec 16, Chandigarh. *Corresponding Author

ABSTRACT

Objective: To evaluate the risk of urinary tract infections in women with bacterial vaginosis.
Methods: One hundred twenty-nine women who presented for routine gynecologic examinations were evaluated for bacterial vaginosis and urinary tract infections between Jan 2000 and Jan 2021.
Results: Sixty-seven women had bacterial vaginosis and 62women did not. Fifteen women with bacterial vaginosis(22.4%) had urinary tract infections, compared with six(9.7%) of those without it. Bacterial vaginosis was associatedwith an increased risk of urinary tract infections (odds ratio2.79; 95% confidence interval 1.05, 8.33).
Conclusion: Women with bacterial vaginosis are at in-creased risk for urinary tract infections.

KEYWORDS

Urinary tract infection, Bacterial vaginosis

INTRODUCTION

Bacterial vaginosis is the most common vaginal infection. Its prevalence varies from 10 to 65% and is higher in sexually transmitted disease (STD) clinics. Bacterial vaginosis results from overgrowth of anaerobic bacteria and *Gardnerella vaginalis*, with loss of normal vaginal flora, specifically lactobacilli. [1,2] Many serious obstetric and gynecologic sequelae have been associated with bacterial vaginosis. Obstetric complications include preterm labor and delivery, preterm rupture of membranes, chorioamnionitis, and endometritis. [3-5] Pelvic inflammatory disease (PID), postabortal PID, posthysterectomy vaginal cuff infections, and mucopurulent cervicitis also have been associated with bacterial vaginosis. [6,7] Urinary tract infections are also common, resulting in more than 6 million doctor office visits annually, two-thirds by women. [8] Complications of urinary tract infections include preterm labor, pyelonephritis, and sepsis. Based on our clinical impression that it might be more common in women with bacterial vaginosis, we evaluated the risk of urinary tract infections in women with and women without bacterial vaginosis.

MATERIALS AND METHODS

After approval of the study by the institutional review board, subjects were recruited at the time of their routine annual examinations at Command Hospital Chandimandir, Haryana and GMSH Sec 16, Chandigarh between Jan 2020 and Jan 2021. Command Hospital Chandimandir, Haryana is an Army set up tertiary care centre serving the dependents of army. GMSH, Sec 16, Chandigarh is an inner-city multi-speciality hospital in a middle-class neighborhood. All women were evaluated by attending physician or third-year resident. A history of symptoms was taken using a standardized form, which included questions about discharge quality, odor, itching, burning, dysuria, urinary frequency, urgency, and pressure. Other routine inquiries were inquiries about frequency of intercourse per week during the 3 months before the examination and any history of STDs. Women who had any type of STD or other vaginal infections, diabetes mellitus, or immune compromise; were using diaphragms, douches, or spermicides; or were pregnant were excluded. Each woman had a pelvic examination. The pH of a discharge sample from the lateral walls of the vagina was assessed, and then a saline wet mount and a whiff test with 10% potassium hydroxide solution were done. Endocervical Swab specimens for culture for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* and clean-catch urine specimens for urinalysis and urine culture were collected from each woman. Bacterial vaginosis was diagnosed when three of four criteria of Amsel et al [9] were met: pH greater than 4.5, homogeneous grayish adherent discharge, fishy odor due to release of amines when10% potassium hydroxide solution is added to the discharge, and clue cells on a saline wet mount, representing at least 20% of the epithelial cells. Definitive diagnosis of urinary tract infections was made when there were at least 100,000 organisms per milliliter of urine. High colony counts that contained more than one species of bacteria in asymptomatic women's urine were considered evidence of contamination. Univariate logistic regression analysis (SAS; SAS In-stitute, Cary, NC) was used to estimate the relationship between individual factors and bacterial vaginosis or urinary tract infections. Using multivariable logistic regression, two variables— bacterial vaginosis and frequency of intercourse in a week—were modeled to determine the effect of each variable on urinary tract infections after adjustment for the other variable. This did not yield a significant multivariate model. Probability values<.05 were considered statistically significant in all analyses.

RESULTS

One hundred twenty-nine women were recruited. Among 67 with bacterial vaginosis, 15 (22.4%) had urinary tract infections, compared with six (9.7%) of 62who did not (Table 1). Women with bacterial vaginosis had an increased risk of urinary tract infections (odds ratio [OR] 2.79; 95% confidence interval [CI] 1.05, 8.33).The groups were equally matched in terms of age (women with bacterial vaginosis: mean age 27.867.7years, range 17– 48 years; women without bacterial vaginosis; mean age 27.967.1 years, range 18 – 46years;P=.718) and race. Our results were similar when statistical evaluation was done separately for each hospital. Frequency of sexual intercourse in a week was significantly associated with bacterial vaginosis (OR 1.48;95% CI 1.09, 2.12) and urinary tract infections (OR 1.44;95% CI 1.03, 2.03), suggesting that increased frequency of sexual intercourse predisposed women to both conditions (Tables 1 and 2). The risk of bacterial vaginosis and urinary tract infections increased significantly (on average, 1.48 and 1.44 times, respectively) with each increase of one time per week. History of STDs was not significantly associated with urinary tract infections but was significantly associated with bacterial vaginosis (Tables 1 and 2).

Table 1. Associations With Bacterial Vaginosis

Factors	Odds ratio*	95% confidence interval	P
UTI	2.79	1.05, 8.33	0.048
Sex/Week	1.48	1.09,2.12	0.020
History of STDs	3.23	1.52,7.11	0.03

UTI= urinary tract infection; Sex/Week= frequency of sexual intercourse in a week; STD= sexually transmitted disease.
*Estimated using Univariate logistic regression analysis.

Table 2. Associations With Urinary Tract Infection

Factors	Odds ratio*	95% confidence interval	P
BV	2.794	1.05, 8.33	0.048
Sex/Week	1.438	1.03,2.03	0.030
History of STDs	1.117		0.03

BV= bacterial vaginosis; Sex/Week= frequency of sexual intercourse in a week; STD= sexually transmitted disease.
*Estimated using Univariate logistic regression analysis.

Bacterial vaginosis and increased frequency of sexual intercourse did not appear to have a significant effect on the risk of urinary tract infections in our multivariate model, because of a high collinearity of those variables. This was a function not of the sample size but rather of

the inherent nature of the variables reflecting aspects of the same disease process. The high degree of collinearity was reflected in the low proportion of discordance in two-way analyses of the predictors. Whereas there was no formal a priori sample calculation, on the basis of the observed incidences of urinary tract infections in the population with and that without bacterial vaginosis, the study yielded an approximate power of 55% based on a two-sided test at the .05 level. Likewise, we had at least ten subjects per independent variable when evaluating the multivariate model.

DISCUSSION

Our MEDLINE search of the medical literature in English published between 1966 and the end of 1998,using the terms "bacterial vaginosis," "nonspecific vaginitis," "Gardnerella vaginitis," "Corynebacterium vaginitis," and "Hemophilus vaginitis" in combination with "urinary tract infection," "acute cystitis," and"cystitis," did not yield any relevant references for direct association between bacterial vaginosis and urinary tract infections. However, in 1989, Hooton et al [10] reported on associations between bacterial vaginosis sand acute cystitis in women who used diaphragms. They studied 291 women and found an association between bacterial vaginosis and Escherichia coli urinary tract infections among the 144 who used diaphragms. Considering the remarkable difference between the organisms that cause bacterial vaginosis and urinary tract infections, it is possible that women with bacterial vaginosis developed urinary tract infections because of frequent sexual intercourse. Our findings support the thesis that increased frequency of sexual intercourse is significantly associated with bacterial vaginosis and urinary tract infections. The collinearity of bacterial vaginosis and increased frequency of sexual intercourse indicated a high correlation. Several studies suggested that sexual intercourse affects development of bacterial vaginosis. Bacterial vaginosis might be sexually transmitted, but therapeutic trials, in which male partners were treated, did not show a reduction in bacterial vaginosis recurrence rates.[11–14] A study by Barbone et al [15] showed that the number of sexual partners women had during the month before follow-up visits directly related to occurrence of bacterial vaginosis. Women who had three or more partners had a relative rate of 1.77, compared with those women with one or no partner. Barbone et al [15] were not able to show an association between rate of bacterial vaginosis and frequency of sexual intercourse. Most investigators consider bacterial vaginosis sexually associated but not sexually transmitted. It is believed that altering the vaginal pH by repetitive alkalinization can contribute to the development of bacterial vaginosis, but further studies are needed to ascertain what exactly causes the association. A prospective study by Hooton et al [16] showed urinary tract infections to be related to increased frequency of sexual intercourse in women, but the investigators did not offer any explanation for this finding. It is plausible that bacterial vaginosis, regardless of increased frequency of sexual intercourse, might facilitate colonization with uropathogens because of over growth of pathogenic bacteria and the absence of lactate and hydrogen peroxide producing lactobacilli in the vagina, putting those women at risk for urinary tract infections. That hypothesis is supported by a study by Stamey and Timothy,[17] who showed a strong correlation between increased vaginal pH and introital colonization with E coli. Further studies are needed to determine the association between bacterial vaginosis and urinary tract infections. Before our results can be put to clinical use, one must consider that the population in this study was based on a convenience sample, available women in the listed clinics who met inclusion criteria during the study period. The danger of that type of sampling is that it might lead to selection bias. If our results are substantiated by further research, it might be necessary to test for bacterial vaginosis in women with urinary tract infections. Evaluating for urinary tract infections in women with bacterial vaginosis also might be cost-effective, in that it might reduce risk of associated complications. Clinical management in pregnant women might be more complicated because of potential perinatal problems associated with those infections.

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