Bacterial vaginosis and urinary tract infection

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OBJECTIVE(S): To study the relationship between bacterial vaginesis (BV) and urinary tract infection (UTI).

METHOD(S): This case control study was carried out on 134 patients labeled as having UTI when urinary culture was positive. Normal individuals with negative culture, matched with the study subjects comprised the control group. Matching was designed for age, frequency of coitus, years of marriage and use of contraception. BV based on standard Amsel criteria was determined in both the groups. The results were analyzed using t test and χ^2 test. The odds ratio and confidence interval were calculated.

RESULTS : Sixty seven patients with UTI were compared with 67 normal individuals. BV was reported in 40.3% and 62.7% in the control and study group respectively (P<0.01, OR = 2.49). Characteristic discharge and pH over 4.5 was reported in 91% , positive whiff in 74% and clue cells in 72% of patients with BV.

CONCLUSION(S) : Individuals with UTI encountered BV significantly more often than those in the control group.

Key words : bacterial vaginosis, urinary tract infection, clue cell

Introduction

Urinary tract infection (UTI) is a very common condition which causes more than 7 million outpatient visits each year [1] and two-thirds of the patients are women [2]. Generally 10-20% of women get symptomatic UTI during their life and about 20 percent of them have recurrence during the next 6 months [2]. The cost of these 7 million episodes of UTI in women in the United States of America is estimated to be more than a million dollars each year [3]. The most important complications of UTI are pyelonephritis, sepsis, and premature delivery. Treatment of women with UTI also needs treatment of genital tract infection. The recent observations show that after beginning of sexual activities the incidence of UTI increases considerably in women [1]. Before appearance of remarkable bacteriurea, the colonization around urethra is found with the same germs that cause UTI [4,5]. UTI is the second most frequent type of infection treated in primary care clinics [6].

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It is obvious that the best way to reduce this problem is the recognition of effective factor in pathogenesis which is the lack of lactobacillus producing peroxide hydrogen as a dominant flora of vagina, which facilitates colonization of coliforms in the lower vagina, the skin around urethra and distal urethra [1].

In 1989 the relationship between bacterial vaginosis a(BV) and UTI in women using diaphragm was reported [7,8]. In 2000, for the first time, there was a report that women suffering from (BV) are at greatest risk of UTI than others [9]. After registering the present research, two other reports were published in 2002 to confirm this hypothesis [10,11].

Considering the presence of only few research studies and lack of information about the incidence of this relationship in Iran and also availability of cheap and fast diagnostic tests we performed this study in women with UTI in 2001-2002.

Methods

This was a case control study. All the patients in our clinic with clinical signs or symptoms of infection in genitourinary system were examined. Clinical signs and symptoms were dysurea, frequency, urgency, pressure feeling, itching, irritation, vaginal discharge, bad odor, and redness, tenderness

and erosion of cervix. We performed a urinary culture for them. The culture was blood agar and eosin methylene blue (EMB) and when there were more than 100,000 pathogenic microorganism (of one kind) in each milliliter of midstream and clean catch urine, we considered it a positive culture. We considered women with positive culture as study group. Pregnant women, immunocompromised women, recent users of drugs affecting immune system, diabetics, those with vaginal bleeding, those with recent use of antibiotics or vaginal creams and women with hospital UTI were excluded from the study [12,13]. A questionnaire completed for each case included age, marital status, reproductive status, occupation, education, husband's education, contraceptive method, frequency of intercourse per week, years of marriage, previous gynecologic surgery, smoking, systemic illness, and presence of candidal or trichomonal infection.

At the same time we had another questionnaire with the same information from our control group which consisted of women without UTI (negative urinary culture). These women were matched for age, frequency of intercourse, years of marriage and kind of family planning method used. Detection of BV was based on Amsel's [14] criteria. Four criteria considered were distinctive discharges of BV, positive whiff test, vaginal pH above 4.5, and presence of clue cells. If a patient had three of these four criteria she was considered as affected by BV. Data from the questionnaires were analyzed using SPSS version 9, and the two groups were compared statistically by t test and chi square tests. Odds Ratio (OR) and confidence interval (CI) with 95% probability were determined.

Results

In all 134 patients were studied. Their mean age was 41.6 ± 9.8 (range 16 to 64) years, number of pregnancies 4.6 ± 2.5, number of deliveries 3.9 ± 2.1 and number of abortions 1.8 ± 14.

The majority of women were married (91%), nonsmokers (83%), without any background disease (79.8%), and housewives (90%). There was no significant difference between the two groups in age, education, husband's education, marital status, years of marriage, smoking, background disease, occupation, gynecologic surgery, kind of family planning method used, years of menopause, and number of pregnancies, deliveries and abortions.

Table 1 gives the symptoms in the two groups. The most common symptom in both the groups was vaginal discharge, followed by dysurea, itching, and frequency. The study group had significantly higher ($P<0.05$) incidence of vaginal discharge and of dysurea ($P<0.05$) as compared with the control group.

Table 1. Symptoms in control and study group.

Symptoms	Control group (n=67)		Study group (n=67)		P value
Dysurea	(29.8)	20	(47.7)	32	< 0.05
Frequency	(32.8)	22	(35.8)	24	>0.05
Urgency	(17.9)	12	(22.3)	15	>0.05
Pressure feeling	(23.8)	16	(14.9)	10	>0.05
Itching	(32.8)	22	(37.3)	25	>0.05
Burning	(14.9)	10	(29.8)	20	<0.05
Vaginal discharge	(65.6)	44	(59.7)	40	>0.05
Bad odor of discharge	(22.3)	15	(28)	19	>0.05

Table 2 gives the clinical signs seen in the two groups. There is no significant difference between the two groups.

Table 2. Clinical signs.

Clinical signs	Control group		Study group	
Cervical redness	(34.3)	23	(22.3)	15
Vaginal discharge	(74.6)	50	(83.5)	56
Bad odor	(49.2)	33	(44.7)	30
Cervical erosion	(19.4)	13	(13.4)	9
Cervical tenderness	(7.4)	5	(4.4)	3

In the control group 27 women (40.3%) and in the study group 42 women (62.7%) were having BV. This difference is highly significant ($P<0.01$). The study group encountered BV more than one and a half times the control group (OR = 2.49; 95% CI 1.3-5).

As seen from Table 4 there was specific vaginal discharge and pH>4.5 in 91.3% of the study group whereas in 73.9% whiff test was positive and in 72.4% clue cells were seen. The differences between the incidences of these criteria in the two groups were highly significant ($P<0.01$).

Table 3. criteria of bacterial vaginosis (n=134).

	Specific discharge of BV	pH >4.5	Positive Whiff test	Clue cell
Bacterial vaginosis absent n=65	27 (41.5)	30 (46.1)	18 (27.6)	12 (18.4)
Bacterial vaginosis present n=67	63 (91.3)	63 (91.3)	51 (73.9)	50 (72.4)
P value	<0.01	<0.01	<0.01	<0.01

Figures in pareuthesis are percentages

It should be noted that 29 or 42% of those with BV had candidal infection and 37 or 53% had trichomonal infection as composed to 15 or 23% and 12 or 18% respectively of those who had no BV. These differences are statistically significant (P<0.05). In women with UTI, 19 or 28% had candidiasis and 22 or 32% had trichomonas infection, a similar incidence.

In 63 or 94% with UTI, the microbe in their urine culture was E. coli, and in 3 or 4.5% it was klebsiella and in 1 or 1.5% it was proteus.

Discussion

We found that women with UTI encountered BV more often than those without UTI.

In 1989, Hooton et al [7] reported that BV or alteration in vaginal microflora which is seen in specific gas-liquid chromatographic pattern of BV is consistent with colonization of E.coli in the entrance of vagina and with symptoms of acute UTI in women using diaphragm. Antibiotics and other drugs that interfere with the normal genital flora may increase the risk of UTI [15]. Harmanli et al [9] conducted a study considering BV and UTI in 129 women during their routine visits and found that 15 of 67 women (22.4%) had both BV and UTI whereas only 6 (9.7%) had UTI without BV. They mentioned a obvious difference between organisms causing BV and UTI, and reported remarkable relation between frequency of intercourse and BV and UTI. Their study had some advantages like a new subject, studying endocervical culture from the viewpoint of gonorrhea and chlamydia, using Amsel's criteria for diagnosis of vaginosis, and urine culture for diagnosis of UTI, though selection bias was one of the limitations. Microorganisms associated with sexually transmited diseases were found in a large percentage of cultures by Gonzalez-Pedraza et al [6] indicating the need for studies to clarify their role in the etiology of UTI.

Hillebrand et al [11] in a cross sectional study examined 503 pregnant women from the viewpoint of UTI and BV and reported that 13.6 percent of 140 women suffering from BV also had UTI whereas only 6.6 percent of 363 women without BV had UTI. They concluded that BV in pregnancy increases the risk of UTI (OR=2.21).

Reid and Burton [10] concluded that lactobacillus with these probable mechanisms reduces the infection of vagina and urinary tract probably by mechanisms like antiadherent factors, lateral products such as hydrogen peroxide, bacteriocine (which is fatal for pathogenic microbes), and perhaps regulating immunity system or signaling effect.

GR-1, B-54, and RC-14 strains reduce the risk of UTI and maintain normal flora and their entrance to the intestine makes vaginal flora healthier. These germs prevent the growth of intestinal and urogenital pathogens. Even GG lactobacillus prevents and treats bacterial viral gastroenteritis. Therefore these bacilli are natural treatment without complications of pharmacological drugs, and patients with resistant UTI and also pregnant women use this bacillus [10].

Factors causing colonization of gram negative bacilli around urethra are unknown but it seems that urethral massage during sexual activity has a facilitating role. Furthermore it seems that proximity of urethra to the anus, shortness of female urethra, its location under labia, and warm and moist environment of perineum have important roles to play. Changing normal vaginal flora by using antibiotics, other genital infections, and type of contraception (diaphragm or spermicide agents) also increase the risk of colonization by coliforms. It must be mentioned that the pathogenicity of microbial germ, inoculum's size, the host's general and local defensive mechanisms and perhaps genetics are noticeable subjects in this field. Considering above statements, urination after intercourse is essential for reducing the risk of UTI. Regarding statistics about patients with BV who also have candidal or trichomonal infection, this synchronism is very important. [5].

Franklin and Monif [16] in considering wet mount of pregnant women found that in 35 to 38% of women with trichomonas infection there is a sexually transmitted disease or an undiagnosed UTI and it is common that pregnant women with trichomoniasis, also have BV.

Our study which seems to be a new subject in Persian research has capabilities and also limitations. Matching control and study group from the viewpoint of confounding factors, using reliable criteria for diagnosis of UTI and BV, facility of performance and inexpensiveness of the study are its capabilities. Considering prevalence of urogenital infections and its preventable and curable course proving probable synchronism between these infections is valuable.

Recommending to evaluate patients with UTI from the viewpoint of BV and vice versa is logical but as in other case control researches, there is a possibility of bias. There is possibility of selection bias, because of selection from hospital patients and also there is possibility of recall bias, because of trusting to patients responses. On the other hand because we didn't screen patients from the viewpoint of gonorrhea and chlamydia or interference of other microbes except gardnella vaginalis the effects of these factors may be ignored.

Finally, it is recommended to schedule future studies for the diagnosis and treatment of BV in prevention of UTI. Special attention to pregnancy is also mandatory. Preventing UTI in women suffering from BV and vice versa seems cost effective and it can reduce the risk of later complications. Therefore we recommend screening for BV.

Conclusion

BV is more common in women with UTI. Prevention of BV and UTI is cost effective. Screening for BV is recommended.

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