

# Sex-induced cystitis - patient burden and other epidemiological features

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## Summary

Although sexual intercourse has been established as an important risk factor for uncomplicated urinary tract infection (UTI) in women, the exact rate of recurrent UTI due to sexual intercourse and its patient burden is unknown.

According to our findings, sex-induced cystitis (SIC) accounts for almost 4% of lower urinary tract infections and for 60% of the recurrent cases. Is most frequent between 23 to 27 years and affect mainly women from low and median socioeconomic groups. Behavioral risk factors of SIC include frequency of sexual intercourse and the use of condoms, while the absence of a stable sexual companion does not add further risk. No seasonal variation has been observed in reinfections suspected of SIC. According to information obtained from our questionnaire each episode of this type of UTI in young women was shown to be associated with three to six days of symptoms and one to three days of restricted activity. *E. coli* was by far the most common pathogen accounting for 95% of primary UTI and 84% of recurrent SIC.

**Key words:** Sex-induced cystitis; Urinary tract infection.

## Introduction

Lower urinary tract infection (UTI) is the most common bacterial infection, with half of all women experiencing at least one lower UTI in their lifetime [1, 2]. Between 10% and 20% of them experience a recurrent uncomplicated lower UTI [3]. Risk factors for recurrence are both genetic and behavioral. Many of them are facilitated by sexual intercourse (sex-induced infections).

General consideration about sex-induced infections is that they are frequent, caused by different species and occur at different and sometimes short intervals. The exact rate of recurrent infections which are possibly due to sexual intercourse (sex-induced cystitis) is not known. Furthermore, it is unknown if women presenting with recurrent sex-induced infections represents a separate population from those who present with an isolated infection.

As cases of fast relapse are not infrequent, they represent a problem of differential diagnosis between bacterial persistence and reinfection from another bacteria (since cultures of the urine are not usually obtained during treatment of simple uncomplicated UTIs). In addition, because of the frequency of recurrence and the additional tests and therapy required a significant burden for health-care costs is incurred.

**Objective:** To investigate the frequency rate and other epidemiological features of sex-induced cystitis as well as to emphasize the differences between the patient burden of ordinary and sex-induced lower urinary tract infections.

## Patients and Methods

Patients in this study included 2,882 women who presented to our institution between August 2000 and August 2004 with symptoms of lower urinary tract infection. All were aged between 15 and 65 years, and all were from Piraeus and suburban locations. There were no significant differences in profession, social class or place of birth.

Women were eligible for enrollment if they had a history of recent cystitis diagnosed clinically within six months. Each patient had to have a urinalysis suggestive of pyuria or more than two signs or symptoms suggestive of an acute uncomplicated UTI (ie, dysuria, frequency, urgency, suprapubic pain), with an onset of symptoms within 72 hours of enrollment. At enrollment, a clean-catch midstream urine specimen was obtained from each patient. A positive culture was defined as isolation of an uropathogen in quantities  $> 10^5$  colony-forming units (CFU)/ml urine, and pyuria was defined as  $> 10$  leukocytes/mm<sup>3</sup> in unspun urine examined in a counting chamber. Women eligible for enrollment were subjected to an ultrasound evaluation of their urinary tract. Cases with abnormalities on ultrasound (dilatation of the ureteropelvic junction, renal calculi, etc.) were excluded. Cases of neurogenic bladder dysfunction, fistula, and/or severe diseases such as diabetes mellitus as well as women under immune suppressing therapies, were also excluded. All patients received an appropriate antimicrobial agent.

The remaining cases were subjected to urinalysis on the third and seventh day of the management. Women with samples containing bacteria were also excluded from further analysis. Women with absence of bacterial growth in the urine culture had to complete a questionnaire on behavioral risk factors. Women with history of at least two episodes of recurrent cystitis who had an active sexual life and reported sexual intercourse 24 to 72 hours before the onset of symptoms were evaluated as possible cases of sex-induced cystitis (SIC) and received prophylactic therapy with a low dose of trimethoprim or cephaclor upon completion of therapy for six months.

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Urinalysis was obtained at six to ten days and six months upon completion of the initial therapy.

## Results

Of 2,882 women initially presenting with symptoms of lower urinary tract infections, only 259 had a history of (at least two) recurrent cystitis within six months from the initial diagnosis, 232 reported an active sexual life and 217 presented signs of a recurrent UTI upon completion of the study.

Twelve women had a negative urinalysis (further evaluation revealed 2 cases of bladder cancer, 4 cases of a simply overactive bladder and 5 cases with no causative organism isolated in sufficient quantity). From the remaining 205 cases, 82 were found to have abnormalities at radiologic evaluation and the last 123 were evaluated as possible cases of SIC.

*E. coli* was by far the most common cause of UTI and SIC accounting for 95% (97 cases) of primary infections and 84% of reinfections (11 cases). Other gram-negative enterobacteria responsible for the remaining infections were *Proteus* (5.6 and 7.6%, respectively) *Klebsiella* (2% only primary infection) and *Staphylococcus saprophyticus* (1.4 and 7.6%, respectively). The last was observed mainly in the urinary cultures of younger females.

The mean age of patients with SIC differed from that of patients with primary lower urinary tract infection. Furthermore, there was an age specific prevalence in the frequency of SIC: was more frequent among women in the age group 20-30 (especially between 23 to 27 years). With increasing age, the frequency of women with SIC progressively decreased, possibly due to social reasons, with an exception in ages between 44 and 47 years, possibly due to postmenopausal phenomena.

According to the information obtained in the questionnaire, 97 women (78.86%) had a prior history of UTI and 25 (25.77%) reported recent and systemic use of antimicrobials. Factors associated with an increased risk of sex-induced cystitis are high frequency of sexual intercourse (34.14% reported more than two sexual intercourses per week) and the systemic use of condoms, diaphragms (15%) and spermicides (7.31%). The absence of a stable sexual companion is not likely to add to SIC risk.

Frequency of initial uncomplicated lower urinary tract infections was slightly higher in autumn. In contrast reinfections did not show seasonal variation.

Sex-induced cystitis affects several aspects of patients' quality of life and affects daily activities. Each episode of this type of UTI in young women was shown to be associated with three to six days of symptoms and one to three days of restricted activity.

The most commonly reported symptoms were frequent urination and urgency to urinate in both isolated infections and sex-induced reinfections. Most women with sex-induced cystitis experienced vaginal discharge before the onset of other symptoms. Other commonly documented symptoms were pain during urination, and inability to completely empty the bladder.

Patients reported that two to five days elapsed between the onset of UTI symptoms and receiving medical attention. The reasons why women waited this long before seeing a physician were not addressed but may be due to social economic reasons.

Sex-induced cystitis seems to affect mainly women from low and median socioeconomic groups. However, since our sample included mostly women of low and median socioeconomic groups this finding may be controversial.

One hundred percent of the cases responded to the initial therapy while 86.17% responded to the prophylactic therapy in terms of absence of recurrence within six to 12 months from initial infection. The most common reason for failure of prophylactic therapy was interruption.

## Discussion

This study addressed several issues regarding symptom burden and epidemiology of sex-induced cystitis. According to our findings several features of possible SIC differ from those of patients with isolated infections reported in the literature. Such features as the aforementioned may suggest that women with SIC are probably predisposed to infections.

Indeed, SIC is a recurrent infection with different bacteria from outside the urinary tract. Since the urine shows no growth after the preceding infection, each episode is a new event.

The exact mechanism is not clear but it seems that sexual intercourse facilitates bacteria to move into the urethra. This may due to the presence of a sufficient number of virulent bacteria in the vaginal flora: according to the literature, reinfections in women are associated more with increased vaginal mucosal receptivity for uropathogens than with an eventual ascending colonization from the fecal flora.

This may explain why cases of *possible* SIC were noted in only 4% of the affected women but accounted for 60% of the recurrent cases.

In addition, foreign bodies encourage colonization of the vaginal area with pathogens. According to the literature diaphragm, spermicide and tampon use have been associated with vaginal colonization with *E. coli* and consequently in an increased risk of UTI and sex induced reinfection [4, 5]. There is an increasing trend for recurrent infections especially in women who use spermicidal agents: Spermicides containing the active ingredient nonoxynol-9 may provide a selective advantage in colonizing the vagina, perhaps by a reduction in colonization population of vaginal lactobacilli and through enhancement of adherence of *E. coli* to epithelial cells [6]. While some authors have suggested that diaphragm users are proposed to have a significantly greater risk of UTI than women who use other contraceptive methods, our results indicate that this is not necessarily the case but this may be due to the small number of diaphragm users in our country.

With increasing age, the frequency of women with SIC progressively decreases with an exception between 45 and 47 years.

The fact that women in the age group 20-30 were significantly more likely to present a reinfection and that the use of contraception agents in women with an active sexual life correlates to higher reinfection rates as well confirms the criteria used for patient selection.

The predominant virulent organism in possible sexually induced reinfections is still *E. coli* but it was found at a smaller rate in urine cultures of reinfected women (95% versus 84%). This may indicate that a subset of sexually induced reinfections may be due to bacteria other than the vaginal flora. Sexual transmission of uropathogens has been suggested by demonstrating identical *E. coli* in the fecal and urinary flora of sex partners [7].

According to our findings only *S. saprophyticus* shows an increased frequency in the urinary cultures of younger females while other bacteria shows no age specific prevalence both in the primary and in reinfection urine cultures. This is in accordance with the study of Latham *et al.* in which prevalence of *S. saprophyticus* was influenced by the age of the patient [8]. Similarly increased frequency of sexually induced reinfections in post-menopausal women caused by *E. coli* may be due to changes in the vaginal microflora (loss of lactobacilli and increased colonization by *E. coli*) [9].

A seasonal variation with a late summer to fall peak has been reported by some authors [10, 11]. This variation is evident in the primary infection. Sexually induced reinfections do not show seasonal variation.

## Conclusion

Although the spectrum of etiological agents of sex-induced reinfections was the same as of the uncomplicated upper and lower UTIs, women presenting recurrent sex-induced infections represent a separate population from those who present an isolated infection.

In addition, the patient burden of this type of UTI is significant, with each episode associated with more symptomatic days than in usual UTIs. Since additional tests and therapy are required, sex-induced cystitis represents a significant burden for healthcare costs.

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