Recurrent Urinary Tract Infections (Rutis) In Pre-Menopausal And Post-Menopausal Women. A Retrospective Study.

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Citation

E Mazokopakis, E Potolidis. *Recurrent Urinary Tract Infections (Rutis) In Pre-Menopausal And Post-Menopausal Women. A Retrospective Study.*. The Internet Journal of Urology. 2012 Volume 9 Number 3.

Abstract

Objective: To investigate possible statistically significant differences in epidemiological characteristics of lower recurrent urinary tract infections (RUTIs) among pre- and post-menopausal women. Patients and Methods: We retrospectively studied the case notes of 84 women (45 pre-menopausal and 39 post-menopausal women, mean age ± SD: 47.4 ± 15.3 years) with symptomatic lower RUTIs who had been managed as outpatients during three years. All women had been interviewed using a structured form and anthropometric characteristics had been recorded. Results: All RUTIs were reinfections caused by the same microorganism with the first UTI episode (>95% E. coli) and not relapses. The mean time of RUTI occurrence after the end of the treatment of first UTI episode was statistically significantly lower among post-menopausal than pre-menopausal women ($p<0.001$). The mean time of RUTI occurrence among 17 post-menopausal women with underlying surgical conditions and urologic factors was statistically significantly lower than that among 22 post-menopausal women without underlying factors ($p<0.001$). There were no statistically significant differences between the menstrual status of women with RUTI and marital status, educational level, smoking habit, or alcohol consumption. There was no significant difference in BMI between pre-menopausal and post-menopausal women with first RUTI episode. Conclusion: Post-menopausal women develop RUTIs earlier than pre-menopausal women. Evaluation of underlying surgical conditions and urologic factors is necessary among post-menopausal women with UTIs.

INTRODUCTION

Urinary tract infections (UTIs) and recurrent urinary tract infections (RUTIs) remain an important public health problem in women of all ages [1, 2]. It is estimated that the incidence of UTIs (acute cystitis) is 0.5 and 0.07 per person per year in young women and post-menopausal women, respectively [2]. Previous studies have shown that the factors underlying RUTIs differ by age and functional status and at least three groups of women with RUTIs should probably be distinguished: pre-menopausal women, post-menopausal women, and elderly institutionalized women [1, 3]. Also, the majority of the recurrences represent reinfections rather than relapses, but most recurrences occur within the first three months after the primary infection, and there can often be clustering of infections [2, 4]. We must remind that RUTI is defined as 2 uncomplicated UTIs in 6 months or, more traditionally, as ≥3 positive cultures within the preceding 12 months [2]. Relapse is a RUTI episode with the same organism which, despite the adequate therapy, occurs within two weeks after the end of the treatment; a RUTI episode that occurs after the first two weeks period, even if the causative agent is the same as the first, is defined as reinfection [2]. Women with RUTI can self-diagnose on the basis of symptoms very accurately, with an 84% positive culture rate [2]. RUTIs need careful investigation and can be efficiently treated and prevented. Recently, recommendations for RUTIs were made according to the guidelines developed by the Canadian Task Force on Preventive Health Care [2].

The purpose of this study was to investigate the presence of possible statistically significant differences in epidemiological characteristics of uncomplicated RUTIs occurred among pre- and post-menopausal women.

PATIENTS AND METHODS

We retrospectively studied the case notes of 234 women with first episode of symptomatic lower UTI (dysuria, urinary frequency, suprapubic pain plus or minus hematuria)

who had been visiting the Emergency and Out-patients' Departments during the last three years (2008-2010). Our study group included eighty four patients who met the following criteria: 1) they developed 2 microbiologically documented episodes of symptomatic lower UTI within a 6-months period which had been managed on a non-nosocomial basis (outpatients); 2) they had not been developed other episode symptomatic UTI at least five years before; 3) they had underwent a gynecologic and urologic evaluation, such as a renal ultrasonography when they were asymptomatic and abacteriuric; and 4) they did not have indwelling catheters.

All women had been interviewed using a structured form, which included items on the following topics: demographic characteristics, such as age, educational level [level A (unfinished or completed primary or secondary school education) and level B (technical college or university)], and marital status [married and single (never married or divorced)]; smoking habit [current smokers (smoking at least one cigarette per day) and non-smokers (never-smokers / former smokers)]; alcohol consumption [abstainers and drinkers (drinking at least one or more alcoholic drinks per day)]; underlying diseases or conditions (including diabetes mellitus, urinary incontinence and menstrual status); and finally previous urologic or/and gynecologic surgical procedures and sexual activity. Anthropometric characteristics had been also recorded. A mixed apparatus had been used to measure body weight (BW) and body height (BH). Body mass index (BMI) was calculated dividing BW in kilograms by the square of the BH in meters.

All women were divided into two groups according to their menstrual status: pre-menopausal and post-menopausal women. The automatically calculated residual urine volume during renal ultrasonography was defined as follows: mild, persistence of 50 mL of urine after micturition; moderate, persistence of a residual urine volume of 50-100 mL; and severe, persistence of a residual urine volume >100 mL.

STATISTICAL ANALYSIS

Values were expressed as mean ± SD. χ^2 test for categorical variables and the Student's t-test for numerical variables were used. All p values were two-tailed, and values <0.05 were considered statistically significant.

RESULTS

There was a total incidence of 3.6 RUTIs per 100 woman-months. The prevalence of first UTIs among pre-menopausal women was 52.5% (123 women), but the prevalence of first UTIs among post-menopausal women was 47.4% (111 women). Seventy patients out of 234 (30%) had been hospitalized with UTI (54 post-menopausal women, 16 pre-menopausal women); 12 out of 54 post-menopausal women had developed RUTI events during the study. Eighty patients out of 234 (34%) had been occurred only one episode UTI (no RUTI episode) during the study (62 pre-menopausal women, 18 post-menopausal women). So, our study population was included 84 women (mean age ± SD: 47.4 ± 15.3 years), - 45 pre-menopausal women (median age 33 years, range 20-46) and 39 post-menopausal women (median age 60 years, range 48-78) - who had been occurred at least one RUTI event according to our criteria and had been managed as outpatients. Only four post-menopausal women out of 84 women had been occurred second RUTI episode during the study. Characteristics of 84 outpatients with RUTI are shown in Table 1.

The majority of 45 pre-menopausal women (76%) reported UTI and RUTI events after sexual activity, but the majority of 39 post-menopausal women (97%) refused to discuss their sexual activity. Among 39 post-menopausal women, total hysterectomy due to uterine carcinoma and urinary incontinence were present in 2 (5%) and 7 (18%) patients, respectively. A moderate post voiding residual urine volume and cystocele were observed in 5 (13%) and 3 (8%) post-menopausal women, respectively. Among 45 pre-menopausal women, polycystic ovarian disease was found in one woman, but underlying surgical conditions or urologic factors were not observed.

The mean time of first RUTI occurrence after the end of the treatment of the first UTI episode was statistically significantly lower among post-menopausal than pre-menopausal women (1.74 ± 1.06 vs 3.9 ± 1.3 months, $p<0.001$). The mean time of RUTI occurrence among 17 post-menopausal women with underlying surgical conditions and urologic factors was statistically significantly lower than that among 22 post-menopausal women (1.17 ± 0.4 vs 2.22 ± 1.2 months, $p<0.001$).

The isolated pathogen from urine cultures during the RUTI event was the same with the isolated pathogen during the first UTI episode in all women. The isolated organisms from urine cultures among patients were Escherichia coli (E. coli) in 42 pre-menopausal women and 38 post-menopausal women, and Proteus mirabilis in 3 pre-menopausal women

and 1 post-menopausal woman. All isolated organisms were susceptible to common antibiotics (second generation cephalosporins and quinolones).

There were no statistically significant differences between the menstrual status of women with RUTIs and marital status (χ^2=0.18, df=1, p>0.05), educational level (χ^2=1.07, df=1, p>0.05), smoking habit (χ^2=0.18, df=1, p>0.05), or alcohol consumption (χ^2=0.36, df=1, p>0.05). There was no statistically significant difference in BMI between pre-menopausal and post-menopausal women with RUTIs (24.5 ± 3.5 vs 26.1 ± 3.7 kg/m^2).

Figure 1

Characteristics of the study population (n = 84 women)
BMI: body mass index

Variable	Mean value ± SD or Number (%)
Age (years)	47.4 ± 15.3
Menstrual status	
Pre-menopausal women	45 (54)
Post-menopausal women	39 (46)
Educational level	
Level A	38 (45)
Level B	46 (55)
Marital status	
Single	19 (23)
Married	65 (77)
Smoking habit	
Current smokers	54 (64)
Non-smokers	30 (36)
Alcohol consumption	
Abstainers	62 (74)
Drinkers	22 (26)
BMI (kg/m^2)	25.3 ± 3.6

BMI: body mass index

DISCUSSION

Our study showed that all RUTIs that had occurred among pre-menopausal and post-menopausal women were reinfections caused by the same microorganism with the first UTI episode (>95% E. coli) and not relapses. Other studies have also shown that the most RUTIs among women are presented during the first three months after the first UTI event [2, 4], such as that the possibility of a second UTI event is higher if the isolated pathogen from urine cultures during the first infection was E. coli [5]. It is known that uropathogenic E. coli have virulence factors, such as the type of fimbria, that promote binding to the epithelium of vagina and urethra and enhance their ability to cause cystitis. Intracellular bacterial communities of uropathogenic E. coli protected from host immune response mechanisms and antibiotic therapy may reactivate, causing RUTIs [2]. Blood-group antigens found on the surface of urothelial cells may affect bacterial adherence and thereby the susceptibility to urinary tract infection. The results of one study have shown an increased frequency of the Lewis blood-group nonsecretor and recessive phenotypes among women with recurrent urinary tract infections [6].

In our study, the mean time of RUTIs occurrence after the end of the treatment of first UTIs was statistically significantly lower among post-menopausal than pre-menopausal women. Also, the mean time of RUTIs occurrence among post-menopausal women with underlying surgical conditions (such as hysterectomy) and urologic factors (such as incontinence, post voiding residual urine volume, and cystocele) was statistically significantly lower than that among post-menopausal women without these factors. Moreover, none of the 45 pre-menopausal women had one or more of the above factors. These findings indicate the importance of underlying surgical conditions and urologic factors for the time of occurrence of RUTI in post- and pre-menopausal women. These factors have been also associated with RUTIs in post-menopausal women in a case-control study [3]. The reduced levels of estrogenic hormones after menopause with their significant effect on the vaginal Lactobacillus flora increasing the intravaginal pH, is another possibly additional factor that could explain the statistically significant difference in the time of occurrence of RUTIs among pre- and post-menopausal women [1-3]. A previous study revealed that urologic factors (such as incontinence, post voiding residual urine volume, abnormal urinary flow, and cystocele) were infrequent and not associated with RUTIs in pre-menopausal women [7]. Scholes et al reported that the major risk factors for RUTIs in pre-menopausal women were the increased frequency of sexual intercourse, use of a spermicide, and new sexual partners [8]. Intercourse and spermicide exposure increase the rate of vaginal and periurethral colonization with E. coli [2].

Although the prevalence of first UTIs in our study was a little higher among pre-menopausal women, hospitalization was demanded for the 48.6% (54 out of 111) of post-menopausal women and only for the 13% (16 out of 123) of

pre-menopausal women, as post-menopausal women are a group with more medical problems and underlying conditions or diseases than pre-menopausal women. The prevalence of occurred first RUTIs in our study population (84 outpatients) was a little higher among pre-menopausal women (54% versus 46%). In fact, the prevalence of first RUTIs who had been managed in our clinics (nosocomial and non-nosocomial) during the three years was higher among post-menopausal women (51 post-menopausal women out of 234 women, 21.8%; 45 pre-menopausal women out of 234 women, 19.2%).

In conclusion, our data support that post-menopausal women appear RUTIs earlier than pre-menopausal women. Evaluation of underlying surgical conditions and urologic factors is necessary among post-menopausal women with UTIs and the proposed interventions must take this finding into account.

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