TITLE:

Urinary tract infection again;


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ABSTRACT

Urinary tract infection (UTI) is a common problem in the female population. Women with diabetes mellitus are possibly more at risk. The usual medical therapy for UTI is antibiotic treatment. The aim of this study is to explore strategies diabetic women employ for prevention and self-treatment of UTI. Forty-two women with diabetes mellitus and at least one episode of UTI in the last six months were included. Data collection included background information, questions about prevention and self-treatment strategies and a clinical examination to measure maximal urine flow, residual urine, a blood test evaluating diabetic control (HbA1c) and a urine test strip for determination of glucose, leucocytes, nitrite, blood, protein and pH. Thirty-five participants (83.3 %) reported changes in daily routines like “always keeping warm”, “increased fluid intake”, “good personal hygiene” as prevention strategies. Different herb and plant extracts were used for prevention by twenty-three participants (54.5 %). Amongst the twenty-three (54.5 %) participants who used self-treatment strategies when they noticed symptoms of UTI, intake of cranberry tablets or capsules was most common. Better knowledge of strategies for prevention and self-treatment of UTI may reduce distress and discomfort for women at risk.

KEY WORDS: women, urinary tract infection, diabetes, prevention, self-treatment.
INTRODUCTION

Urinary tract infections (UTIs) are familiar to many women. Approximately 50 % of all women have at least one such infection in their lifetime (Foxman et al. 2000; Franco 2005). UTIs cause pain, distress and time off work or school. Several studies show that women with diabetes mellitus are at greater risk of developing UTI than nondiabetics (Boyko et al. 2005; Muller et al. 2005). The commonest way to treat urinary tract infection is antibiotic medication for 3 to 7 days. Many women make efforts towards prevention or self-treatment to avoid developing a UTI, or to ease distress when they notice symptoms. Efficient prevention and self-treatment strategies may reduce the need for antibiotics, and thereby reduce the risk of bacterial resistance developing.

Therefore, the aim of this study is to uncover what women with diabetes mellitus actually do to avoid getting a UTI, and what they do to treat themselves when they notice symptoms of UTI.

BACKGROUND

Urinary tract infection (UTI) is a common problem in the female population. The two major risk factors for UTI in young women are recent sexual intercourse and a history of recurrent UTIs (Franco 2005). Similar risk factors seem to be dominant also for community dwelling postmenopausal women (Moore et al. 2008a). Other risk factors of some importance for UTI include residual urine, urinary incontinence, increased Body Mass Index (BMI), asymptomatic bacteriuria, oestrogen deficiency and diabetes mellitus (Muller et al. 2005; Fihn 2003; Perrotta et al. 2008; Moore et al. 2008b; Stamm and Raz 2004; Sarma et al. 2009; Semins et al. 2009). People with diabetes mellitus (type 1 or 2) appear to be more susceptible to all types of infections. Suggested reasons for this are advancing age, poor glucose control
(high HbA1c), poor bladder emptying due to peripheral neuropathy, and dysfunction in the immune system (Shah and Hux 2003). However, in a recent epidemiological study, Czaja et al found the same prevalence of UTI in women with type 1 diabetes mellitus as in nondiabetic women (2009).

Young women with recurrent UTIs usually recognize their symptoms easily when they have an infection. Gupta et al. found that in 85 % of the cases where young women diagnosed themselves with UTI, the infection was microbiologically confirmed (2001). The majority of women in the present study were postmenopausal, and it is possible that a number of the women who have reported self-treated UTI’s did not actually have a UTI. When consulting the doctor with symptoms of UTI, the patients are usually given antibiotic medication (Drekonja and Johnson 2008).

Ferry et al. (2004) studied the natural course of uncomplicated urinary tract infections in women, and estimated a spontaneous cure rate of all symptoms after 5-7 weeks at only 36 %. In other words; before antibiotics were available women had to rely on remedies and advice for weeks on end before the symptoms abated.

To ease pain and discomfort of UTI, books of old remedies suggest drinking a cup of a decoction of parsley, sage, bearberry, goldenrod or horsetail every morning and evening. If this does not sound particularly appetizing, the patient could try a spoonful of honey twice a day. Apple cider vinegar and cranberry juice were also recommended for prevention or treatment of UTI. In Norwegian folk medicine juniper has been used to treat UTIs (Santelmann 1994; Wicklund 1989; Jepson and Craig 2008). In addition to herbs and plants lactic acid applied vaginally is a familiar advice to European women suffering from UTI (Falagas et al. 2006). Acupuncture is an ancient method known from the Far East, and is gaining supporters in the Western World, also for use against UTI. Little is known about the present use of the above mentioned treatments.
As resistant bacteria have become a growing concern, alternative treatments have been approached with renewed interest. In recent years medical advice and treatment is expected to be evidence based. Systematic reviews show that cranberry has some effect in preventing recurrent UTIs (McMurdo et al. 2009; Nowack 2007; Jepson and Craig 2008). There are substances in cranberries that can prevent bacteria from adhering to the bladder wall. Probiotics (certain types of lactobacilli) are beneficial in the re-establishment of the natural environment in the vagina, and may thereby prevent recurrent UTIs (Falagas et al. 2006). In postmenopausal women local oestrogen replacement may have an effect in the prevention of recurrent UTIs (Perrotta et al. 2008). For many traditional and alternative treatments there is a lack of quality trials to establish evidence for efficacy. This study seeks to uncover what remedies and advice women prone to UTI actually use for prevention and self-treatment, in other words a first step towards further research in this area.

METHODS

The design of this study is exploratory.

Eligible for inclusion were women (aged 18 +) with diabetes mellitus type 1 or 2, who had experienced at least one UTI in the last 6 months. The infections could be treated by prescribed antibiotics or self-treated following diagnosis by the women themselves.

Following approval by the Norwegian Committee for Ethics in Medical Research and reporting to the Institutional Review Board, female members of the county Diabetic Society were sent a letter inviting them to participate in the study. In addition, posters and leaflets with information and invitation to participate were posted in relevant outpatient wards (gynaecological, diabetes, overweight) at the county hospital.

Participants in the study were seen in the gynaecological outpatients department by the author between February and June 2010. Before data collection started, they received
information about the study and signed a written consent. The data covered background information, answers to a semi-structured interview focusing on prevention and self-treatment strategies, and a clinical examination. Background information included age, height, weight, type and duration of diabetes, menopausal status, oestrogen use, frequency of sexual intercourse, number of self-treated and antibiotics treated UTI’s in the last 6 months and urinary incontinence. In the interview the participants were asked what they do to prevent getting a UTI and what they do to treat themselves when they notice symptoms. They were also asked if they had observed particular activities or lifestyles that seemed to generate an infection. Data on prevention and self-treatment strategies and provoking activities were collected during an interview, and after the interview this information was classified in quantitative categories. The clinical examination included measurement of urinary flow, post void residual urine estimated by sonography, a test strip for determination of glucose, leukocytes, nitrite, protein, blood and pH in urine and a blood test for HbA1c determination. If the urine test strip was positive for nitrite or leukocytes and the participant described ongoing symptoms of UTI, a specimen was sent to a laboratory for culture. The data were registered in SPSS version 17.0 for analysis. Frequencies, crosstabs and explore were used.

RESULTS

Background information

Forty-two participants were included in the study during the 5 month inclusion period. All but one participant were recruited through the 936 letters sent out via the county Diabetic Society.

Table 1. Background information

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>64.0</td>
<td>22</td>
<td>85</td>
<td>14.1</td>
</tr>
<tr>
<td>Diabetes duration (years)</td>
<td>17.4</td>
<td>1</td>
<td>53</td>
<td>15.0</td>
</tr>
</tbody>
</table>
As table 1 shows, the mean age of the participants was 64 years, and the majority (85.7 %) were postmenopausal. Seven (19.4 %) of the postmenopausal women used some type of hormone replacement therapy. Mean duration of diabetes mellitus was 17 years, and thirty of the women (71.4 %) had type 2. The participants had reasonably well controlled blood sugar levels, with a mean HbA1c value of 6.96. A mean BMI of 27.1 implies that the majority of participants were overweight. Half of the participants (50 %) did not suffer from urinary incontinence. Most of the participants (71.4 %) were not sexually very active.

Table 2. Clinical findings

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal urinary flow</td>
<td>27</td>
<td>18.1</td>
<td>3</td>
<td>43</td>
<td>9.5</td>
</tr>
<tr>
<td>Residual urine</td>
<td>42</td>
<td>39.3</td>
<td>0</td>
<td>275</td>
<td>71.6</td>
</tr>
<tr>
<td>HbA1c</td>
<td>40</td>
<td>6.96</td>
<td>4.8</td>
<td>9.6</td>
<td>1.0</td>
</tr>
<tr>
<td>Urine pH</td>
<td>41</td>
<td>5.5</td>
<td>5.0</td>
<td>7.0</td>
<td>.8</td>
</tr>
</tbody>
</table>

Although registration of maximal urine flow produced no useful information, it was a convenient way to collect urine for a specimen. Five specimens were sent to the laboratory after test strip results of positive leukocytes and/or positive nitrite and symptoms of UTI.
Three patients received antibiotic medication after the study visit, due to bacterial growth in specimen and symptoms of UTI.

Table 3. Residual urine and treatment strategies

<table>
<thead>
<tr>
<th>Residual urine</th>
<th>&lt;100 ml</th>
<th>≥100 ml</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTIs treated with antibiotics</td>
<td>0 episodes</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>(Some participants had only self-treated UTIs.)</td>
<td>1 episode</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>2 or more episodes</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Total (n)</td>
<td>35</td>
<td>7</td>
<td>42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residual urine</th>
<th>&lt;100 ml</th>
<th>≥100 ml</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-treated UTI</td>
<td>0 episodes</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>(Some participants had no self-treated UTIs.)</td>
<td>1 episode</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2 or more episodes</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Total (n)</td>
<td>35</td>
<td>7</td>
<td>42</td>
</tr>
</tbody>
</table>

Seven participants (16.7%) had more than 100 ml residual urine. Six of them had been prescribed antibiotic treatment for UTI twice or more in the last six months. None of those seven had any self-treated UTIs in the same period. The correlation between post void residual urine and UTIs requiring antibiotic treatment was not statistically significant. It was noted that eight (19%) of the participants were referred for further examination after the study visit, due to residual urine exceeding 150 ml and/or because of severe urinary incontinence.

Prevention strategies

Prevention strategies are actions the women take to reduce their risk of developing a UTI.

Table 4. Prevention strategies

<table>
<thead>
<tr>
<th>No prevention strategies</th>
<th>N=42</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
<td>16.7</td>
</tr>
</tbody>
</table>
In the table, the total number exceeds 42 because some of the participants used several different strategies. Only seven (16.7%) of the women in this study used no prevention strategies. Thirty-five (83.3%) of the participants had implemented changes in their everyday life in order to prevent developing UTI. The commonest change was always to keep warm by using warm underwear, avoiding sitting on cold surfaces and avoiding swimming in cold water. Other changes included increased fluid intake, good personal hygiene, and postcoital voiding. Of herbs and plant extracts, cranberry products were by far the most used. Several participants used more than one strategy. Four participants used prescription medication for UTI prevention, such as long-term antibiotics or hippuric acid.

**Self-treatment strategies**

At the onset of symptoms of UTI, many women use strategies that may ease the discomfort and improve their condition. The women in this study were not asked how many days they would use self-treatment strategies before seeking medical advice.

**Table 5. Self-treatment strategies**

<table>
<thead>
<tr>
<th>No self-treatment strategies</th>
<th>N=42</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbs and plant extracts</td>
<td>16</td>
<td>38.1</td>
</tr>
<tr>
<td>Increased fluid intake, acidic fluids</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Keep warm</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Alternative treatment (healing, reflexology)</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Lactic acid</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Antibiotics at home</td>
<td>1</td>
<td>2.4</td>
</tr>
</tbody>
</table>
The total number exceeds 42 because some of the participants used more than one strategy. Nineteen of the women (45.2 %) in this study reported no self-treatment strategies. Their strategy was to see their doctor when they noticed symptoms of UTI. Amongst the twenty-three women who used self-treatment strategies, fourteen (61 %) would take or increase the dosage of different herbs and plant extracts; most popular was cranberry capsules or tablets. Ten women (23.8 %) increased their fluid intake or drank more acidic fluids. Five women (11.9 %) made a special effort to keep warm, applied lactic acid vaginally or consulted a reflexologist or a healer. One participant had antibiotics at home, and started treatment on her own.

**Activities or lifestyles that may provoke UTI**

Many women who are prone to UTIs have thoughts or observations on actions or situations that make them more susceptible to developing a UTI. Table 6 displays what the participants in this study thought were important.

<table>
<thead>
<tr>
<th>Feeling cold/freezing</th>
<th>19</th>
<th>45.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coitus</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>Unstable blood sugar levels</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Antibiotic treatment for other infections</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Poor bladder emptying</td>
<td>1</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Freezing, feeling cold and sitting on cold surfaces were the most frequently mentioned factors for provoking UTI. Nineteen (45 %) of the participants thought that such activities might make them more prone to UTI. Of the participants who said that being cold could induce an infection, only eight (42.1 %) actually said that they kept warm as a prevention strategy. Only two participants mentioned unstable blood sugar level as a risk factor for UTI.
DISCUSSION

UTIs are common in the female population. In this study we chose recruitment through the county Diabetic Society. Members of such societies may not be representative of all women in the community, but it was a convenient way to get in touch with many possible study participants. However, it is probable that these women do reflect the female population reasonably well, though membership in the Diabetic Society perhaps indicates an above-average interest in health questions. The 42 women in the study represent 4.5% of the 936 women who were sent invitation letters and had experienced at least one UTI in the last 6 months, which corresponds well with Foxman’s estimate that 11% of women have a UTI in 12 months (2000).

Leydon et al (2009) performed a qualitative interview of women consulting their doctor with symptoms of UTI. They found that failure to alleviate symptoms by traditional remedies or other self-care strategies were the commonest reasons for seeking medical help. They did not, however, inquire into what remedies or strategies had been used. Other studies show that use of complementary and alternative medicine is common, but patients are not inclined to tell the doctor what strategies they have used (Canter and Ernst 2004; Howell et al. 2006; Palinkas and Kabongo 2000). The present study tries to elucidate this aspect.

The strategies used for prevention of UTI that we have found in this study point to changes in everyday routines, mostly by generally keeping warm and avoiding freezing. It is widespread lay knowledge that being cold may cause infections, which is also indicated in a small study by Baerheim and Laerum. They found that having cold feet may induce symptomatic infection in women prone to recurrent UTI (1993).
Apart from changes in daily routines, intake of cranberry tablets or capsules was the commonest strategy, for prevention as well as treatment of UTI. Systematic reviews show that cranberry products can be effective, particularly in the prevention of UTI’s (Jepson and Craig 2008; Jepson et al. 2009). These products are often marketed and recommended at pharmacies and health product shops. Other herbs and herb and plant extracts may also be effective, but systematic trials have not yet been executed. Only two participants in this study had tried alternative treatments like healing or reflexology. Good quality trials on the effect of these strategies are difficult to find.

As the number of participants in this study was limited, correlation or regression analyzes between different strategies and number of UTIs did not give significant results. Although poor regulation of blood sugar levels have not been shown to increase the risk of developing UTI (Chen et al. 2009; Czaja et al. 2009), one might have expected that more than 5 % of the participating women would have thought that this condition had an influence on the susceptibility to acquire a UTI. In this study the women using self-treatment strategies had to diagnose themselves with UTI. As Gupta et al. (2001) found that 85 % of women’s self-diagnosis were correct, it is safe to assume that the majority of self-diagnosed UTIs in this study could have been microbiologically confirmed.

Study participants did not know in advance what questions to expect before the data collection. It is therefore possible that some of them did not remember or formulate clearly, as the strategies may be tacit knowledge and part of their routines of daily living. That may explain why only eight of the nineteen women who saw freezing as a provocative action for UTI, said that they consciously kept warm to prevent developing UTI. Moreover, women with the most effective prevention strategies might not have had an infection in the last six months, and were therefore not eligible for inclusion. However, this study gives insight into what diabetic women do themselves for prevention and self-treatment of UTI. This is useful
information for nurses who often find themselves in a position where they are asked for advice in these matters.

**CONCLUSION**

Knowledge of effective prevention and self-treatment strategies for women with UTI can contribute to reducing the need for antibiotics. Most of the participants in this study (83.3%) had implemented changes in their everyday routines to prevent UTI. Keeping warm was the dominant activity. Of remedies and natural medications for prevention as well as self-treatment, intake of cranberry tablets or capsules was the most common. Women with post-void residual urine over 100 ml reported a higher number of UTIs requiring antibiotic medication in the last 6 months compared to women without residual urine, although that result was not statistically significant.

Activities for prevention and self-treatment are partially tacit knowledge well incorporated in daily routines. It is important to contribute to a better articulation of this knowledge, since the strategies, advice and remedies that some women find useful may also be beneficial for others. We should also acknowledge that although randomised controlled trials may not be able to show statistically significant effects, these remedies for prevention and self-treatment could alleviate symptoms and reduce discomfort for women prone to UTI. More research is required to determine use, effect and possible side-effects of such remedial actions.

**KEY POINTS**

Urinary tract infection is common in women.
Various prevention and self-treatment strategies may reduce the need for antibiotic treatment. More research is required to produce evidence as to the effect (and possible side effects) of these strategies.

**Conflict of interest statement**

There are no conflicts of interest concerning this study.

**Reference List**


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