Prevalence and Predisposing Factors for Self-reported Recurrent Urinary Tract Infections Among Adults With Type 2 Diabetes Mellitus

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ABSTRACT

Background: Adults with diabetes are more susceptible to developing lower urinary tract infections due to various predisposing factors, such as hyperglycemia-related impairment of immune response.

Objectives: To estimate the prevalence of and determine predisposing factors for self-reported recurrent urinary tract infections (UTIs) among adults with type 2 diabetes mellitus (T2DM).

Methods: In the US **S**tudy to **H**elp **I**mprove **E**arly evaluation and management of risk factors **L**eading to **D**iabetes (SHIELD) 2008 survey, respondents reported how many times in the past 12 months they had a UTI. Respondents with T2DM who reported 3 or more UTIs were classified as recurrent and were compared with T2DM respondents who reported 1-2 UTIs (non-recurrent) and those without UTIs using chi-square and *t*-tests and logistic regression models.

Results: Among T2DM respondents (n = 2,671), 3% reported recurrent UTIs, 10% reported non-recurrent UTI, and 87% reported no UTIs. Among those with UTI,23% reported recurrent UTIs. Recurrent UTI group was similar to the non-recurrent UTI group in bivariate and multivariate analyses, except for chronic pulmonary disease (COPD). Recurrent UTI group had significantly more women, less education, lower income, higher body mass index, longer diabetes duration, more receiving insulin, and more comorbid conditions than those without UTIs. Predictors of recurrent UTIs compared with no UTIs from the multivariate model were female gender (OR = 2.0), overactive bladder (OR = 3.3), enlarged prostate (OR = 11.2), kidney problems (OR = 2.6), and atherosclerosis (OR = 3.4).

Conclusions: Among those with a reported UTI, approximately one-quarter of T2DM adults have self-reported recurrent UTIs within a year, and select demographic and clinical characteristics available in routine clinical practice may assist in identifying those likely to have recurrent UTIs.

CONFLICT OF INTEREST STATEMENT:

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BACKGROUND

- Diabetes has been associated with an increased risk of UTI[1]
- Patients with diabetes often have increased complications of UTI, including rare complications, fungal infections, and increased severity of UTI and unusual manifestations of UTI[2]
- Many women experience relapses or reinfections of the lower urinary tract even after treatment with broad-spectrum antibiotics[3,4]
- Yet, there is limited information on the prevalence of recurrent UTIs in diabetes and what factors may predispose individuals to recurrent UTIs

OBJECTIVES

- To estimate the prevalence of self-reported recurrent UTIs among individuals with T2DM
- To determine the predisposing factors for recurrent UTIs among individuals with T2DM

METHODS

Study Design

- Cross-sectional analysis of data collected in 2008 among SHIELD respondents with T2DM
- **S**tudy to **H**elp **I**mprove **E**arly evaluation and management of risk factors **L**eading to **D**iabetes (SHIELD) is a 5-year population-based survey conducted to better understand the risk for the development of diabetes, as well as disease burden
  - Based upon a screening questionnaire mailed to 200,000 nationally representative households (TNS NFO Household Panel), responses for 211,097 adults from 127,420 households were obtained (64% response rate)
  - A baseline survey was sent in 2004 to 22,001 selected individuals derived from the screening respondents. Since 2005, annual SHIELD surveys have captured self-reported information on health status, attitudes and behaviors, quality of life, and anthropometry from this representative sample of the US population
  - The 2008 survey collected information from 14,921 individuals (71% response rate), and 2,671 respondents had T2DM (18%)

Study Population

- Respondents were 18 years of age or older
- Self-reported diagnosis of T2DM was based on being "told by a doctor, nurse or other healthcare professional that you have type 2 diabetes"

Study Measures

- Respondents were asked how many times in the past 12 months they had a UTI
- Respondents with T2DM were classified as having recurrent, non-recurrent, or no UTIs in the past 12 months
  - Recurrent UTIs = reported 3 or more UTIs
  - Non-recurrent UTIs = reported 1 or 2 UTIs
  - No infection = reported 0 UTIs
- Overweight was defined as BMI of 25.0–29.9 kg/m^2, and obese was defined as a BMI ≥30 kg/m^2
- Comorbid conditions were self-reported based on survey questions of being told by a healthcare professional that they had the condition

METHODS (Continued)

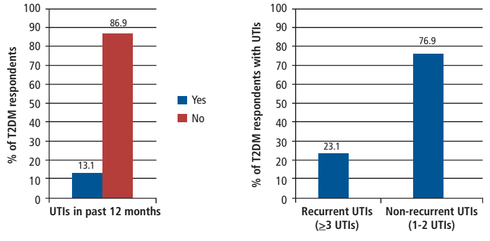
Statistical Analyses

- T2DM respondents reporting recurrent UTIs were compared with T2DM respondents who reported non-recurrent UTIs or no infections
- Comparisons between respondents with and without reported recurrent UTIs were conducted using chi-square test for categorical variables and *t*-tests for continuous variables
- Logistic regression was used to determine predisposing factors for recurrent UTIs compared with no UTIs or non-recurrent UTIs. Odds of having a recurrent UTI with all baseline characteristics in the model were calculated
- Statistical significance was set *a priori* as p <0.05

RESULTS

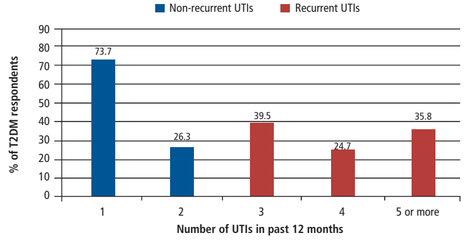
Prevalence of Recurrent UTIs

Figure 1. Proportion of T2DM respondents with and without UTIs, n = 2,671



- Among the 2,671 respondents with T2DM, 351 respondents (13.1%) reported UTIs, and 2,320 (86.9%) reported no UTIs
- Among those reporting UTIs (n = 351), 23.1% reported recurrent UTIs

Figure 2. Number of UTIs in the past 12 months among those with and without reported recurrent UTIs



- Majority (74%) of T2DM respondents reporting non-recurrent UTIs had only 1 UTI in the past 12 months (Figure 2)
- Approximately 64% of T2DM respondents reporting recurrent UTIs had 3-4 UTIs and 36% had 5 or more UTIs in the past 12 months

RESULTS (Continued)

Table 1. Characteristics of SHIELD T2DM respondents with and without recurrent UTIs, n = 2,671

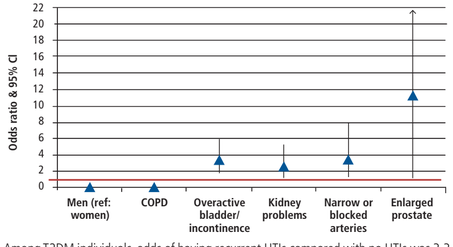
Characteristics	Recurrent UTIs (n = 81)	Non-recurrent UTIs (n = 270)	No UTIs (n=2,320)
Age, years, mean (SD)	63.4 (12.7)	63.5 (12.3)	63.0 (11.6)
Women, %	90.1*[b]	83.0[c]	56.6
White, %	80.2	73.0	73.1
Education, high school degree or less, %	46.2*[b]	42.1[c]	32.7
Household income <$30,000, %	56.8*[b]	50.4[c]	33.8
Body mass index, mean (SD)	37.0 (9.8)*[b]	35.3 (9.5)[c]	33.8 (8.0)
Diabetes duration, years, mean (SD)	13.9 (10.5)*[b]	13.0 (9.4)[c]	11.3 (8.5)
Treated with insulin, %	29.2*[b]	26.0[c]	20.2
Narrow or blocked arteries, %	17.3*[b]	11.1	8.6
Cholesterol problem, %	81.5	70.7	74.7
Heart disease, %	25.9	25.6	23.7
Hypertension, %	82.7	73.0	72.0
Angioplasty, stent, or bypass surgery, %	7.4	12.2	11.3
Arthritis, %	69.1*[ab]	54.4[c]	47.6
Kidney problems, %	25.9*[b]	17.0[c]	8.3
Overactive bladder/incontinence, %	35.8*[b]	24.8[c]	9.9
COPD, %	7.4*	13.7[c]	6.7

*p <0.05 across the 3 groups; a = significant difference between recurrent and non-recurrent, b = significant difference between recurrent and no UTI, c = significant difference between non-recurrent and no UTI

- Recurrent UTIs group was similar to the non-recurrent UTI group, except for arthritis, where a larger proportion of the recurrent UTIs group (69%) had arthritis than the non-recurrent UTI group (54%) (Table 1)
- Recurrent UTIs T2DM group had significantly more women, less education, lower income, higher BMI, longer diabetes duration, more receiving insulin, and more comorbid conditions than T2DM group with no UTIs

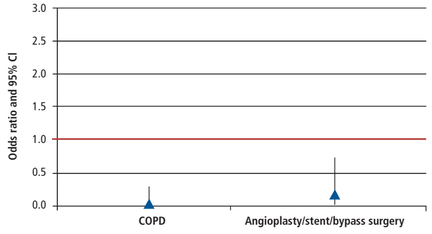
Predisposing Factors for Recurrent UTIs for Individuals with T2DM

Figure 3. Logistic regression model for predictors of recurrent UTIs in the past 12 months compared with no UTIs



- Among T2DM individuals, odds of having recurrent UTIs compared with no UTIs was 3.3 times higher (95% CI: 1.8-6.0) if respondents had overactive bladder/incontinence, 2.6 times higher (95% CI: 1.3-5.2) if respondents had kidney problems, 3.4 times higher (95% CI: 1.4-8.0) if respondents had reported narrowed or blocked arteries, and 11.2 times higher if respondents had an enlarged prostate (95% CI: 1.2-106.0) (Figure 3)
- T2DM respondents who were male or those reporting COPD had significantly lower odds of having recurrent UTIs compared with no UTIs
- Age, race, BMI, duration of diabetes, household income, education, insulin treatment, and other comorbid conditions did not significantly predict the likelihood of recurrent UTIs among the T2DM respondents

Figure 4. Logistic regression model for predictors of recurrent UTIs in the past 12 months compared with non-recurrent UTIs



- Odds of having recurrent UTIs compared with non-recurrent UTI were significantly lower if T2DM respondents had reported COPD or cardiac revascularization (e.g. angioplasty) (Figure 4)
- Age, gender, race, BMI, duration of diabetes, household income, education, insulin treatment, and other comorbid conditions did not significantly predict the likelihood of recurrent UTIs among the T2DM respondents

LIMITATIONS

- Diagnosis of diabetes, other comorbid conditions, and UTI were self-reported and could not be validated with laboratory tests, medical records review or administrative claims data. However, this bias is similar between the groups compared in this study
- Household panels, like the TNS NFO panel, tend to under-represent the very wealthy and very poor segments of the population and do not include military or institutionalized individuals

CONCLUSIONS

- Among T2DM respondents with a reported UTI, approximately 25% of adults have self-reported recurrent UTIs within 1 year
- Among T2DM respondents, female gender, overactive bladder/incontinence, kidney problems, enlarged prostate, and narrow or blocked arteries increased the odds of recurrent UTIs compared with no UTIs
- T2DM respondents reporting COPD were significantly less likely to have recurrent UTIs than those not reporting COPD
- These demographic and clinical characteristics available in routine clinical practice may assist in identifying those likely to have recurrent UTIs

References

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Abbreviations

BMI	Body mass index
COPD	Chronic obstructive pulmonary disease
SHIELD	Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes
T2DM	Type 2 diabetes mellitus
TNS NFO	Taylor Nelson Sofres National Family Opinion
UTI	Urinary tract infection

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