



## Prevalence and Clinical Profile of Urinary Tract Infection among Patients in Tertiary Care Hospital

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*(Received: 16 March 2025*

*Revised: 20 April 2025*

*Accepted: 01 May 2025)*

### KEYWORDS

Urinary tract infection, Diabetes mellitus, Prevalence, Recurrent UTI, RUTISS

### ABSTRACT:

**BACKGROUND:** UTI is a condition in which one or more than one part of the urinary system becomes infected. UTI is the most common of the bacterial infections. It is mainly caused by gram negative bacteria like E. Coli, Klebsiella and pseudomonas aeruginosa. The risk factors of UTI includes diabetes, menopause, use of SGLT-2 inhibitors, renal stone, etc. and the recurrence of UTI can be controlled by assessing these risk factors. Diabetes mellitus is a clinical syndrome characterized by hyperglycaemia caused by absolute or relative deficiency of insulin. Diabetic patients have a higher incidence of UTI than non-diabetic patients, with a higher severity UTI which can be a cause of complications ranging from dysuria to organ damage and sometimes even can cause complicated UTI. The severity of UTI among patients was also compared using RUTISS, which helps in detecting the quality of life.

**AIM AND OBJECTIVES:** To compare the prevalence of UTI in diabetes mellitus and non-diabetes mellitus patients. The Objectives is to compare the prevalence of UTI, to describe the prescription pattern for UTI, to assess the risk factors of UTI, to detect the effect of hypoglycaemia agents in UTI, to evaluate the quality of life in UTI patients and to assess the effect of UTI in DM and non-DM patients.

**METHOD:** A prospective cross-sectional study was conducted in general medicine, gynaecology, paediatrics, surgery and MOS departments of a 450 bedded tertiary care hospital and the study was carried out for a period of 6 months. 110 patients were included in the study. We took around 1300 of total patient for the calculation of prevalence of UTI among them. The data were collected using the data entry form, informed consent form and survey form (RUTISS). The documented data were analysed by graphical and statistical methods.

**RESULT:** A total of 110 patients with UTI were included in the study. The study patients were comprised of 40 males and 70 females. The prevalence of UTI were analysed among diabetic and non-diabetic patients and the diabetic patients shown more prevalent among them. The quality of life was also assessed using RUTISS and it showed that the severity of UTI were negatively associated with diabetes mellitus. The study also shows that the diabetes is the main risk factor for UTI and the hypoglycemic agent SGLT-2 Inhibitors play an important role in developing it. Piperacillin/tazobactam and cefperazone/sulbactam are the most commonly prescribed antibiotics in the study.

**CONCLUSION:** The study provides a baseline data on the UTI among diabetic and non-diabetic patients. UTI has a higher prevalence in patients with DM. With increasing incidence of DM and the complications such as UTI; our health care system requires appropriate screening and treatment options.



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Diabetes is seen to be the main risk factors in UTI. So, the recurrence of UTI was higher among diabetic patients.

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## 1. Introduction

Urinary tract infections (UTIs) are among the most prevalent bacterial infections worldwide, affecting individuals of all ages. Except among infants and the elderly, the infection occurs more commonly in women than in men and it was estimated that about 40–50% of women experience one episode in their lives and 20–30% of them have other episodes. About 5% of women of childbearing age and 10%–20% of women overall will experience a urinary tract infection (UTI) in their lifetime<sup>(1, 2)</sup> and recurrent UTIs (rUTIs) constitute a significant health problem for many women. While both diabetic and non-diabetic populations experience UTIs, research indicates a significantly higher prevalence in diabetic patients due to multiple physiological and immunological factors. Diabetes mellitus (DM) predisposes individuals to recurrent and complicated UTIs due to impaired immune function, hyperglycemia-induced changes in urine composition, and neuropathy-related bladder dysfunction. Studies suggest that diabetic individuals have nearly twice the risk of developing UTIs compared to non-diabetic counterparts, with a higher incidence of recurrent UTIs (RUTIs) and severe complications such as pyelonephritis and urosepsis.

In both groups, ‘*Escherichia coli*’ remains the predominant uropathogen<sup>(4)</sup>; however, diabetic patients exhibit a higher prevalence of antibiotic-resistant strains, including extended-spectrum beta-lactamase (ESBL)-producing bacteria. Risk factors such as female anatomy, prolonged catheterization, urinary retention, and poor glycemic control further contribute to infection susceptibility in diabetics.<sup>(9, 10)</sup> In contrast, non-diabetic individuals typically experience uncomplicated UTIs, often triggered by lifestyle factors, sexual activity, or transient immune suppression.

To quantify and assess the severity of RUTIs, the “Recurrent UTI Symptom Scale (RUTISS)” has been developed as a standardized tool for evaluating patient-reported symptom severity and disease burden<sup>(32)</sup>. The RUTISS score incorporates parameters such as frequency, severity, and duration of urinary symptoms, offering a valuable metric for comparing UTI severity in

diabetic versus non-diabetic populations. The scale facilitates improved clinical decision-making, personalized treatment approaches, and longitudinal monitoring of infection recurrence.

This study aims to compare the “prevalence, risk factors, and microbial profiles of UTIs in diabetic and non-diabetic patients”, utilizing the RUTISS to assess symptom burden and recurrence patterns. Understanding these differences is crucial for developing targeted prevention strategies and optimizing antimicrobial therapies to mitigate complications in vulnerable populations.

## 2. Methods

### Study design and setting:

This cross-sectional prospective study was carried out for six months in a 450-bedded tertiary care center to find out the comparison of the prevalence of Urinary Tract Infection (UTI) between Diabetes Mellitus (DM) and Non-Diabetes Mellitus (non-DM) patients. 1,300 patients were screened, of which 110 UTI cases diagnosed were enrolled. The study was conducted in the general medicine, surgery, paediatrics and gynaecology.

### Inclusion and exclusion criteria:

Inclusion criteria included patients who were admitted with or presented symptoms of UTI in general medicine, paediatrics, surgery and gynaecology of all age groups and both genders. Psychiatric and ambulatory patients were not included.

### Ethical approval:

The study was approved from the hospital authority and institutional human ethical committee (IHEC/SJCP/A-008/2022-2023).

### Study Procedure

Data collection was through patient medical records and direct contact, taking demographic information, previous medical and medication history, laboratory results, diagnostic results, and medications prescribed. The responses were documented in a structured format. Patient information was collected using a data entry form



that included details such as name, age, sex, admission date, discharge date, reason for admission, medical history, medication history, social history, known allergies, and lab results. Quality of life effect of UTI was measured through the RUTISS (Revised Urinary Tract Infection Symptom Score). Data analysis was done with SPSS software, and the results were shown statistically and graphically.

**Statistical analysis:**

The analysis of the data was conducted utilizing the Statistical Package for the Social Sciences (SPSS) version 21.0. Comparison of Prevalence of UTI among diabetic and non-diabetic cases was done by using Z-test for two independent proportions. Comparison of RUTISS severity score among diabetic and non-diabetic cases was done by using independent t-test. The Chi-square test, were employed to compare the recurrence of UTI among diabetic and non-diabetic cases.

**3. Results**

**Table 1: Comparison of Prevalence of UTI among diabetic and non-diabetic cases**

Comparison of Prevalence of UTI among diabetic and non-diabetic cases was done by using Z-test for two independent proportions

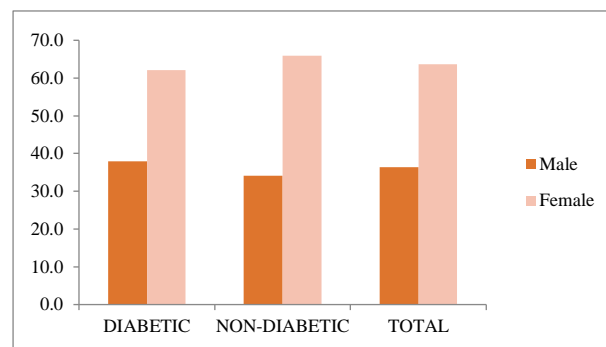
Group	Total Cases	No. Of UTI Cases	Prevalence of UTI Cases	Z-Value	P-Value
Diabetic	600	66	11.0	2.998*	0.003
Non-diabetic	700	44	6.3		

\*\* Significant at 0.01 level

The comparison of prevalence of UTI among diabetic and non-diabetic cases was done by using z test for two independent proportions. Out of 1300 patients 600 patients was found to be diabetic and 700 patients found to be non- diabetic. Among the 600 diabetic patients, 66 patients had UTI and out 700 non-diabetic patients, 44 had UTI. Hence the prevalence of UTI among the diabetic patients found be higher with 11.0 when compared to the prevalence of UTI in non- diabetic

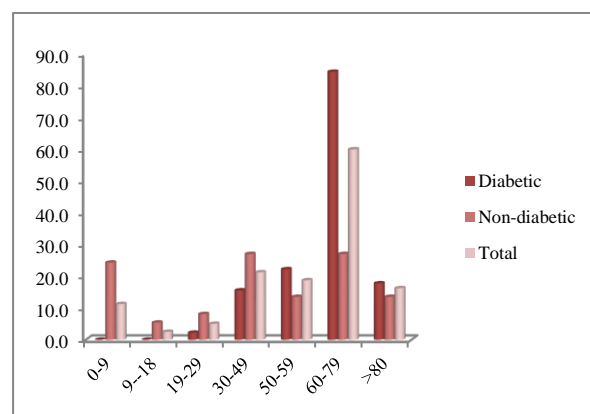
patients with 6.3. The comparison of prevalence of UTI among diabetic and non- diabetic patients was done by using paired t-test. The P value i.e. signify has checked and was found to be significant.

**Figure 1: Comparison of gender (n=110)**



The collected patient’s details (n=110) reveals that the majority of UTI patients were females in both DM and non-DM category. Out of total Diabetic UTI patients (n1=66) about 62.1% (n=41) were female and in non-diabetic population (n=44) about 65.9(n=29) were female. Which shows that female subjects have an increased risk of DM in the general population.

**Figure 2: Comparison of age group (n=110)**

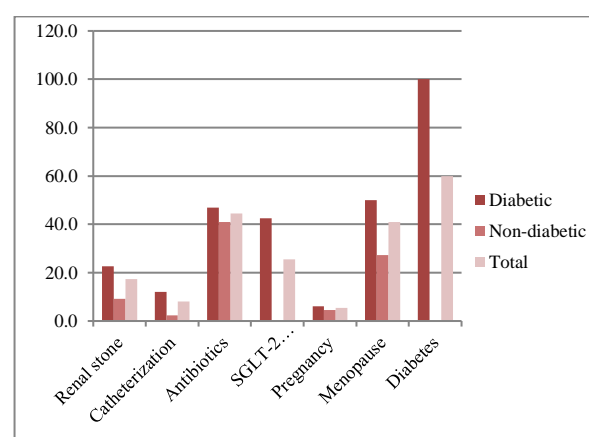


The study depicts that the age group between 60-79 have higher incidence of UTI. The age group of 60-79 also have higher incidence of UTI with diabetes i.e.84.4% (n=38) and the age group of 30-49 and 60-79 possess majority of UTI patients without DM (n=10, i.e. 27%).

**Table 2. Comparison of antibiotics consumed between the two groups (n=110)**

Antibiotics	Diabetic (N=66)	%	Non-Diabetic (N=44)	%	Total (N=110)	%
Trimethoprim/sulfamethoxazole	1	1.5	0	0	1	0.9
Nitrofurantoin	7	10.6	2	4.5	9	8.2
Cefoperazone/sulbactam	18	27.3	10	22.7	28	25.5
Piperacillin/tazobactam	25	37.9	11	25.0	36	32.7
Levofloxacin	1	1.5	0	0.0	1	0.9
Norfloxacin	1	1.5	1	2.3	2	1.8
Ceftriaxone	15	22.7	12	27.3	27	24.5
Fosfomycin	1	1.5	0	0.0	1	0.9
Amoxicillin	0	0.0	0	0.0	0	0.0
Linezolid	1	1.5	1	2.3	2	1.8
Cefoxitin	1	1.5	1	2.3	2	1.8
Rifampin	0	0.0	0	0.0	0	0.0
Cotrimoxazole	0	0.0	0	0.0	0	0.0
Amikacin	4	6.1	9	20.5	13	11.8
Clindamycin	2	3.0	1	2.3	3	2.7
Vancomycin	0	0.0	0	0.0	0	0.0
Ciprofloxacin	4	6.1	2	4.5	6	5.5
Meropenem	16	24.2	6	13.6	22	20.0

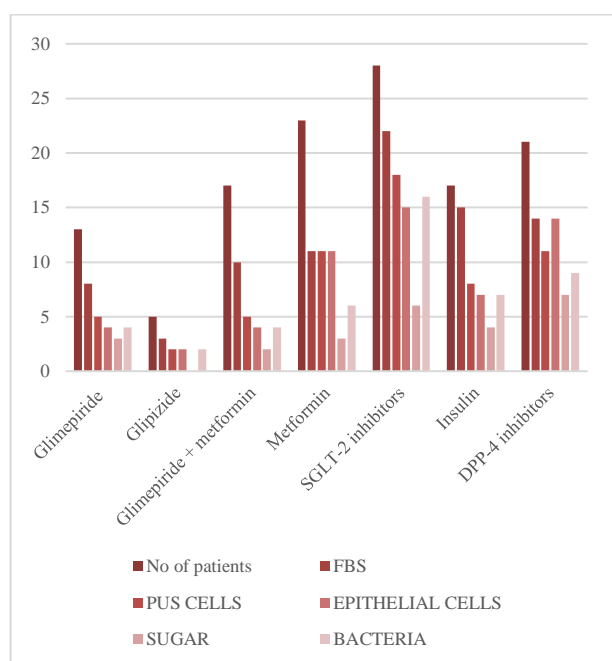
In the study, majority of the antibiotics prescribed were piperacillin/tazobactam (32.7%, n=36) followed by ceftazidime/sulbactam (25.5%, n=25) and ceftriaxone (24.5%, n=27). Trimethoprim /sulfamethoxazole, levofloxacin, fosfomycin (0.9%, n=1) were the least prescribed antibiotics. The most commonly prescribed drug among the diabetic UTI patients was piperacillin/tazobactam (37.9%, n=25) and among the non-diabetic UTI patients was ceftriaxone (27.3%, n=27).

**Figure 3: Comparison of risk factors in UTI patients (n=110)**



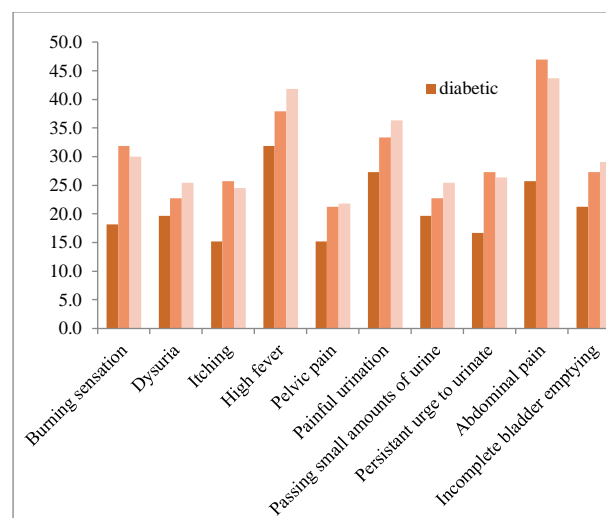
The most common risk factors contributing to the development of UTI includes renal stones, catheterization, antibiotics, SGLT-2 inhibitors, pregnancy, menopause, diabetes among which the most prevailing risk factor is diabetes (60% n = 66) followed by use of antibiotics (44.5% n= 49).

**Figure 4. Effect of hypoglycemic agents in UTI**



In a study population of 110 patients with UTI 66 patients had diabetes mellitus and the prescribing patterns and effect of hypoglycemic agents in the population was analyzed. The most common hypoglycemic agents prescribed was SGLT2 inhibitors (n=28) followed by metformin (n=23). The prevalence of abnormality of urine analysis predisposing to the development of UTI was found to be higher among the patients who were prescribed with SGLT2 inhibitors (pus cells=18, epithelial cells=15, sugar=6, presence of bacteria=16). The FBS count was also compared and the patients who were prescribed with SGLT2 inhibitors showed higher prevalence of abnormal values (n=22).

**Figure 5. Comparison of complaints in UTI patients**



Symptoms presented by patients during admission include burning sensation during urination, dysuria, itching, high fever, pelvic pain, painful urination, persistent urge to pass urine, passing small amount of urine and abdominal pain. The most common symptoms presented was abdominal pain with 43.6% (n=48) followed by high fever with 41.8% (n=46) and painful urination with 36.4%. (n=40) When comparing the prevalence of symptoms among diabetic and non-diabetic patients, the higher prevalence was seen among the non-diabetic population.

**Table 3. Distribution of RUTISS severity score**

Severity	Diabetic (N=66)	%	Non-Diabetic (N=44)	%
Mild	12	18.2	9	20.5
Moderate	46	69.7	29	65.9
Severe	8	12.1	6	13.6
Recurrent	16	24.2	9	20.5

Comparison of RUTISS severity score among diabetic and non-diabetic cases was done by using independent t-test.



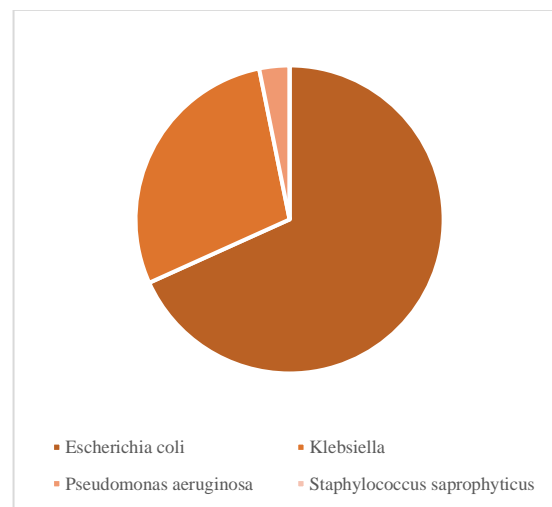
**Table 4. Comparison of severity between two groups using RUTISS**

Group	RUTISS Severity score		t-value	P-value
	Mean	SD		
Diabetic	30.665	12.77	1.061 <sup>ns</sup>	0.291
Non-diabetic	33.418	14.13		
Total	31.766	13.33		

ns non-significant

To assess severity and quality of life of patients the 'Recurrent urinary tract infection severity score' was used. The questionnaire has four domains which are Urinary symptoms, Urinary Presentation, UTI pain or discomfort and bodily sensations. The severity scores above or equal to 50 is considered to be severe, 20-49 as moderate and values less than 20 is considered to be mild. When comparing the severity of symptoms which affect the quality of life of patients; 20.5% of the non-diabetic population and 18.2% of diabetic patients was presented with mild symptoms, whereas 65.9% non-diabetic patients and 69.7% of diabetic patients presented with moderate symptoms. But the non-diabetic population was at higher risk for developing severe symptoms with 13.6% when compared to the 12.1% of diabetic patients. When comparing the prevalence of recurrence of UTI, the diabetic population presented the higher prevalence with 24.2% when compared to the 20.5% of the non-diabetic population. Comparison of RUTISS score among diabetic and non-diabetic patients was done by using independent t-test. The t value was found to be 1.061 (p value =0.291). Hence it was non-significant proving that severity and UTI symptoms are negatively associated.

**Figure 6. Culture and sensitivity test**



In a total of 110 patients the culture and sensitivity test were done in 87 patients. Out of these 87 patients 63 patients showed abnormal bacterial culture. The various type of Organism found where E. coli, Klebsiella, Pseudomonas aeruginosa, Staphylococcus saprophyticus. The most common Organism present was Escherichia coli with 68.25 % (n=43) followed by Klebsiella with 28.57 percentage (n=18).

#### 4. Discussion

This research examined the prevalence, risk factors, clinical features, and treatment practices of UTI among DM and non-DM patients. Out of 1,300 screened patients, 66 (11%) out of 600 diabetic patients and 44 (6.3%) out of 700 non-diabetic patients were found to have UTI, which was a significantly higher prevalence among DM patients. Gender distribution showed that females were disproportionately affected across both groups, with 62.1% of diabetic and 65.9% of non-diabetic UTI patients being female. In the study conducted by Valluri soma Shekhar et al (2020) titled as "A clinical and microbiological profile of urinary tract infection in diabetes mellitus patients, a south Indian perceptive" proved that female subjects have an increased risk of DM in the general population<sup>(35)</sup>. The incidence was highest across the 60-79 age group, with diabetic patients (84.4%) being predominantly affected.

Antibiotic prescription trends indicated that piperacillin/tazobactam was the most frequently



prescribed medication for diabetic UTI patients (37.9%), with ceftriaxone being most commonly prescribed in non-diabetic cases (27.3%). The dominated prescribing pattern of cephalosporins and penicillins in the pharmacological treatment of UTI was concurrent with the study conducted by Lindamol Vargheese et.al (2020) entitled as "Prescribing patterns of drugs for treatment of UTI in postmenopausal women in a tertiary care hospital"<sup>(36)</sup>. Risk factors like diabetes (60%), more than 2 weeks of antibiotic use (44.5%), and catheterization were key factors in UTI development. The higher prevalence of developing UTI among the diabetic patients was found to be similar to the studies conducted by Rahul R Kotalwar et. al (2021) entitled as "Recurrent and complicated urinary tract infection in type 2 diabetes: Case series"<sup>(37)</sup>. The research also investigated the influence of hypoglycemic agents, which revealed that SGLT2 inhibitor patients had more abnormal urine analysis results such as bacterial findings and increased pus cell counts. Symptom comparison revealed that dysuria, itching, and fever were more common in non-DM patients. The symptoms like dysuria, itching, high fever was also stated in the study conducted by Rajani Dube et.al (2022) entitled a "Prevalence, clinico-bacteriological profile and antibiotic resistance of symptomatic urinary tract infections"<sup>(38)</sup>.

Quality of life evaluation by the RUTISS score showed that there were mostly moderate symptoms in the majority of the patients, and there was slightly more prevalence of severe symptoms among non-DM patients (13.6%) than among diabetic patients (12.1%). Nevertheless, recurrent UTI was more common among diabetic patients (24.2%). Escherichia coli was the most prevalent pathogen identified by culture and sensitivity on 87 patients (68.25%), and Klebsiella ranked next (28.57%). This research supports increased risk of UTI among diabetics and calls for timely detection, special treatment, and cautious management of causative agents like antibiotic use and hypoglycemic drugs

## Conclusion:

Urinary tract infection (UTI) is a condition in which one or more than one part of the urinary system (The kidneys, ureters, bladder and urethra) become infected. UTI is the most common of all bacterial infection. The study provides a baseline data on the current scenario of the UTI among diabetic and non-diabetic patients. UTI has a

higher prevalence in patients with DM. Our health care system requires appropriate screening and treatment options for it. UTI will have been considered as one the most serious public health problems if left untreated. Care of diabetes should include reducing the risk for UTI. When comparing the severity and quality of life in UTI patients with and without DM using RUTISS, it was found that there is no association between them. The recurrence of UTI was higher among diabetic patients than to the non-diabetic patients. If appropriate treatment and routine check-up are helpful, prevention of UTI can be achieved at a comparatively lower cost. It is the responsibility of the pharmacist to conduct more educational programmes about UTI not only to reduce the sufferings of the Patients and to decrease their hospital stay and thereby reduce cost.

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