

# Prevalence of Urinary Tract Infection in Diabetes Mellitus Patients.

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## ABSTRACT

**Background:** Diabetes mellitus has a number of long-term effects on the genitourinary system. These effects predispose to bacterial urinary tract infections (UTIs) in the patient with diabetes mellitus. Complicated UTIs are also common and potentially life-threatening conditions. **Aim:** The aim of this study was to assess the prevalence of UTIs among hospitalized diabetic patients and to identify the most frequent bacteria responsible for UTI. **Methods:** Cross-sectional study in patients with Diabetes were approached to participate in the study, irrespective of UTI symptoms. Socio-demographic and clinical data were obtained from each participant using pre-tested questionnaires. **Results:** The prevalence of Urinary Tract Infection in diabetic population was 27.5% and comparable with published reports. Urinary tract infection in diabetes was independent of age and HbA1c levels at the time of urine culture. Asymptomatic Urinary Tract Infection was significantly more among women with diabetics. Among urinary tract infection, gram negative isolates were greater than gram positive ones. *E. coli* was the commonest organism followed by *Klebsiella pneumonia* causing UTI in diabetes. Most organisms show sensitivity to Amikacin. **Conclusion:** UTIs are common and potentially life-threatening conditions in diabetic patients. Early diagnosis, knowledge of common predisposing factors, appropriate clinical and radiological assessment, and prolonged course of appropriate antibiotherapy are mandatory to improve prognosis.

**Keywords:** Diabetes, Urinary tract infection, Bacteriuria, *E. Coli*, *K. pneumoniae*.

## INTRODUCTION

Diabetes mellitus refers to a group of common metabolic disorders that shares the phenotype of hyperglycemia. Several distinct types of DM exist and are caused by a complex interaction of genetics and environmental factors.<sup>[1]</sup> Depending on the etiology of the DM, factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production. Diabetes produces various acute and chronic complications. Diabetic ketoacidosis, hyperosmolar nonketotic hyperglycemia, lactic acidosis are important acute metabolic complications. Chronic complications include neuropathy, nephropathy and retinopathy which are due to micro vascular disease and cerebrovascular accident, cardiovascular disease and peripheral vascular disease which are due to macro vascular disease. Type 2 diabetes mellitus which was previously known as non insulin dependent or maturity onset diabetes is the commonest form of the disease, accounting for 85-95% of all cases worldwide and affecting 5-7% of the world's population.<sup>[2]</sup> Infection is a leading cause of hospitalisation among diabetic patients. 2 Diabetes is associated with increased risk of developing

infections.<sup>[3]</sup> Altered host defenses and vascular abnormalities are responsible for increased incidence. Urinary tract is the most prevalent infection site.<sup>[4]</sup> Respiratory tract infection and soft tissue infection are also common infections with increased incidence in diabetes. Many urinary tract infections are asymptomatic. The development of asymptomatic bacteriuria is more common in diabetic women than in non-diabetic women.<sup>[5,6]</sup> Various risk factors for ASB in women with diabetes have been suggested including age, duration of diabetes, complications of diabetes.<sup>[7]</sup> Diabetes is associated with increased severity of infection and prolonged hospital stay.<sup>[8]</sup> Serious complications of urinary tract infection such as emphysematous cystitis, pyelonephritis, renal or perinephric abscess, bacteremia and renal papillary necrosis occur more commonly in diabetic patients.<sup>[9]</sup>

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### Aim

The aim of this study was to assess the prevalence of UTIs among hospitalized diabetic patients and to

identify the most frequent bacteria responsible for UTI.

## MATERIALS AND METHODS

This cross sectional study was conducted in Department of Medicine, Tirunelveli Medical College Hospital. Consecutive male and female patients with type I or type II DM who attended the referral clinic were approached to participate in the study, regardless of the presence or absence of UTI symptoms. Exclusion criteria included pregnancy, known underlying renal pathology or chronic renal disease, or use of antimicrobial therapy during the previous month. After providing written informed consent, relevant clinical and socio-demographic characteristics were collected using pre-tested questionnaires. Every patient was asked about symptoms suggestive of UTI (e.g., urgency, dysuria, urinary frequency, loin pain, and nausea) and histories of other medical disorders, such as hypertension and, for males, prostate enlargement were recorded.

## RESULTS

Out of 120 patients, 60 were female and 60 were male. Majority of study subjects belonged to age group 51 to 60 years which was followed by 41 to 50 years. Study group age ranged from 19 to 93 years with a mean of  $53.22 \pm 13.86$ . Type 1 and type 2 diabetes distribution in study group was 5.8% and 94.2% respectively. Duration of diabetes in this group was between within 1 year to 28 years with a mean of  $9.09 \pm 6.37$ . Mean values of Fasting plasma glucose, postprandial plasma glucose and HbA1c were  $165.39 \pm 57.95$ mg/dL,  $258.10 \pm 79.53$ mg/dL and  $7.74 \pm 0.90\%$  respectively. Mean values of systolic and diastolic blood pressure were  $132.50 \pm 7.2879$ mm/Hg,  $84.63 \pm 5.79$ mm/Hg respectively. Mean values of Height, Weight and BMI were  $161.16 \pm 12.69$ cm,  $68.88 \pm 13.33$ Kg, and  $26.29 \pm 2.36$ kg/m<sup>2</sup>. [Table 1] In this study group of 120 patients, symptoms of UTI were present only in 6 patients (5%) and rests of the 114 patients (95%) were asymptomatic, irrespective of their sex and urine culture results. [Table 2] 30 patients had pyuria. Out of 33 culture positive subjects, 27 had no symptoms of UTI and 6 subjects had symptoms of UTI. 33 subjects (27.5%) had UTI, out of which 24 were female and 9 were male, the percentage value were 20% and 7.5% respectively. Out of 33 culture positive subjects, 27 had no symptoms of UTI and 6 subjects had symptoms of UTI. This shows statistical significance in asymptomatic infection when compared to symptomatic infection in diabetic patients (P value <0.0001). Out of 33 patients with UTI, E.Coli is the most common organism followed by Klebsiella Pneumoniae and Pseudomonas Species. [Figure 1] 24 females had UTI infections,

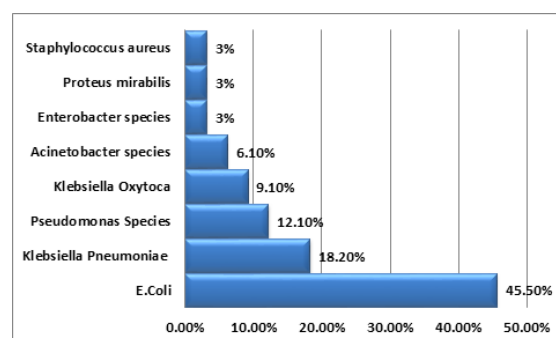
female gender which shows statistical significance in association of UTI in diabetes. (P value 0.002) More than 9 years of duration of diabetes shown significant association of UTI in diabetes. (P value <0.0001)

**Table 1 Distribution of characteristics of study patients.**

Characteristics	Mean	S.D
Age	53.22	13.86
Duration of Diabetes	9.09	6.37
FBS (mg/dl)	165.39	57.95
PPBS (mg/dl)	258.1	79.53
HbA1c (%)	7.74	0.9
SBP (mmHg)	132.5	7.28
DBP (mmHg)	84.63	5.79
Height (cm)	161.16	12.69
Weight (kg)	68.88	13.33
BMI (kg/m <sup>2</sup> )	26.29	2.36

**Table 2: Cross tabulation of UTI symptoms with culture.**

UTI Symptoms	Culture Positive	Culture Negative	P value
Present	6	0	<0.000
Absent	27	87	1



**Figure 1: UTI organisms in culture.**

## DISCUSSION

Patients with diabetes have worse outcomes of UTI than those without diabetes.<sup>[10,11]</sup> Diabetes was found to be risk factor for early clinical failure after 72 hours of antibiotic treatment in women with community-onset acute pyelonephritis.<sup>[12]</sup> Diabetes is also associated with longer hospitalization, bacteremia, azotemia, and septic shock in patients with UTI. Mortality from UTI is 5 times higher in patients with diabetes aged 65 and older, as compared to elderly control patients.<sup>[13]</sup>

In this study, out of 120 subjects with diabetes, 33 subjects had urinary tract infection; prevalence of UTI was 27.5%. In this study, prevalence in female and male diabetics was 20% and 7.5% respectively. These results were comparable with previous studies.<sup>[14]</sup> Jaspan et al conducted a study in 198 subjects (111 females and 87 males) which shows prevalence of bacteriuria was 27% in females and 8% in males.<sup>[15]</sup> Geerlings et al done a study in 636 nonpregnant diabetic women (type 1 and type 2) the prevalence of asymptomatic bacteriuria was 26%.<sup>[16]</sup>

O'Sullivan et al conducted a study in 91 female and 59 male diabetics, which shows the prevalence was 19.8% and 3.3% respectively.<sup>[17]</sup> Kass EH study on 54 female and 37 male diabetics shows the prevalence of asymptomatic bacteriuria to be 18% and 5% respectively.<sup>[18]</sup> Hansen RO studied asymptomatic bacteriuria in 81 female and 67 male diabetics, in which the prevalence was 18.5% and 7.5% respectively.<sup>[19]</sup> Another study by Vejlsgaard R shows prevalence of bacteriuria was 18.8% in females and 0.7% in males.<sup>[20]</sup> Some other studies show less prevalence of UTI in Diabetic population. Study by Ooi BS85 et al shows prevalence of bacteriuria was 15.8% in females and 1.3% in males.<sup>[21]</sup> Another study by Abu-Bakare A et al shows prevalence of bacteriuria was 9.0% and 3.3% in females and males respectively.<sup>[22]</sup>

## CONCLUSION

The results of the study revealed that urinary tract infection was present among 27.5% diabetics. UTI was independent of the patient's age and HbA1c levels. Pyuria (leukocyturia) was found to be significantly correlated with urinary tract infection in diabetes. The longer the duration of diabetes mellitus, greater is the risk of urinary tract infection.

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