

## ORIGINAL RESEARCH

# PREVALENCE AND ANTIBIOTIC SENSITIVITY OF MICROORGANISMS CAUSING UTI IN DIABETICS

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### ABSTRACT:

**Background:** Urinary tract infections (UTI) are among most prevalent illnesses seen in diabetics. To reduce the morbidity of symptomatic infection, early diagnosis and treatment is indicated. This study was done to assess the prevalence of UTI in diabetics, responsible organism & antibiotic sensitivity.

**Materials and Methods:** A total of 100 diabetics >18 years of age reporting to department of Microbiology were studied. Urine examination was done for isolation and antibiotic sensitivity testing.

**Results:** Prevalence of UTI was 39 %. E. coli followed by Enterococcus and Klebsiella spp were most commonly isolated. These were sensitive to amikacin, imipenem and linezolid.

**Conclusion:** Isolation and antimicrobial sensitivity testing of uropathogens is vital in diabetics with UTI.

**Keywords:** Antibiotic sensitivity, Diabetes mellitus, UTI.

### INTRODUCTION:

Diabetes mellitus (DM) is a metabolic disorder manifested by hyperglycemia due to defects in secretion or action of insulin or both. The chronic hyperglycemia in diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels.<sup>[1]</sup>

UTI are one of the most common infections in diabetics and is a common cause of illness as well as a major source of antibiotic resistance.<sup>[2]</sup>

Among diabetics, UTI is often associated with complications such as pyelonephritis, shock and may cause mortality. E. coli, Klebsiella spp., Pseudomonas, Proteus spp., etc. have been isolated by different researchers.<sup>[3-8]</sup>

Infection of the urinary system arises because of the combination of bacterial pathogenicity with host physiological and behavioural variables, rather than highly effective host defence mechanisms. Diabetics have a tenfold greater risk of bacteriuria. The presence of possible pathogens in fresh urine in numbers larger than anticipated to occur from contamination is required to establish urinary tract infection.<sup>[9]</sup>

To reduce the morbidity of symptomatic infection, early diagnosis and treatment is indicated. Urinary tract infection occurs when pathogenic germs are found in the urine with or without symptoms.<sup>[10]</sup>

Screening for UTI in diabetes patients is critical and hence, this study was conducted to better understand the prevalence of uropathogen and antibiotic sensitivity in diabetics with clinically diagnosed UTI.

### **Aims and objectives**

This study was done to assess the prevalence of UTI in diabetics, responsible organism & antibiotic sensitivity.

### **MATERIALS & METHODS:**

The present study was conducted in the department of Microbiology at a medical college. Patients with Type 2 diabetes mellitus, >18 years of age were studied. Patients using antibiotics in last 2 weeks and those with Type 1 diabetes were excluded.

A total of 100 diabetics fulfilling the selection criteria whose urine were tested in the department of microbiology were included. Informed consent was taken from all the participants. Brief clinical history was taken. They were advised how to take urine sample. Sterile container was used for sample collection. Macroscopic examination of samples was done followed by wet film preparation and Gram staining. Surface streaking using 5 % sheep blood agar, Cysteine Lactose Electrolyte Deficient agar with bromo-thymol blue and MacConkey agar was done for culture. Inoculation and overnight incubation was done. Isolates were identified by staining, cultural and biochemical tests.

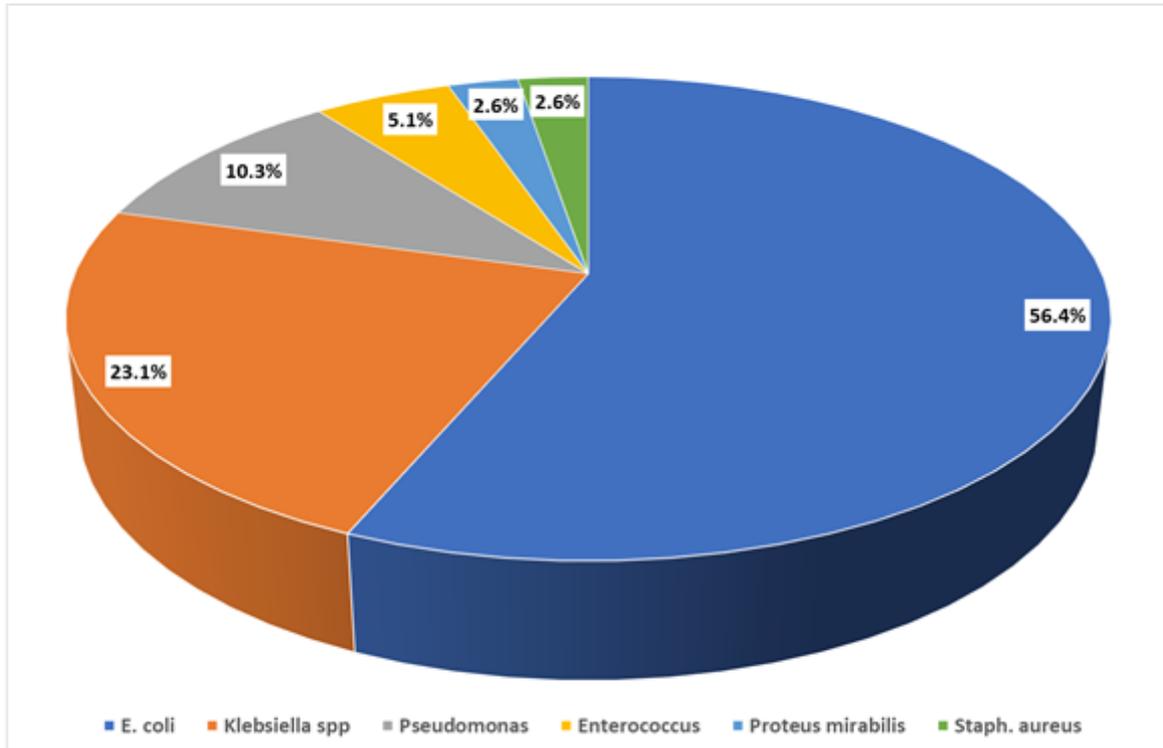
Antibiotic sensitivity was assessed using Kirby- Bauer method was done. Zone of inhibition of growth was measured and interpreted as per CLSI guidelines.

The data was entered in Microsoft excel 2019. SPSS v 20.0 was used for statistical analysis. IEC approval was obtained. Informed consent was taken before study. Confidentiality was maintained.

### **RESULTS:**

53% of the patients were males while 47% were females. The mean age was  $58.7 \pm 2.9$  years. The prevalence of UTI was found to be 39% with female preponderance (44.2% vs 35.1%). The most common age group involved was 50-60 years.

*E. coli* (56.4%), *Klebsiella* spp (23.1%), *Pseudomonas* (10.3%), *Enterococcus* (5.1%), *Proteus* (2.6%) and *Staphylococcus* (2.6%) were isolated. [Figure 1]



**Figure 1: organisms isolated**

Gram negative organisms were sensitive to Imipenem followed by Amikacin. Gram positive ones were sensitive to Linezolid [Table 1].

**Table 1: showing antimicrobial sensitivity**

Antimicrobial agents	Sensitive	%
<b>Gram negative (n=36)</b>		
Amikacin	34	94.4%
Imipenem	32	88.9%
Ciprofloxacin	11	30.6%
Ampicillin	2	5.6%
Gentamicin	22	61.1%
Cefotaxime	19	52.8%
Norfloxacin	23	63.9%
<b>Gram positive (n=3)</b>		
Ampicillin	2	66.7%
Linezolid	3	100%
Cefotaxime	0	0%
Ciprofloxacin	2	66.7%
Clindamycin	2	66.7%

## DISCUSSION:

We found that the mean age of diabetics was  $58.7 \pm 2.9$  years. The prevalence of UTI was found to be 39%. *E. coli* (56.4%), *Klebsiella* spp (23.1%), *Pseudomonas* (10.3%) and *Enterococcus* (5.1%) were isolated. Gram negative organisms were sensitive to Imipenem and Amikacin while gram positive ones were sensitive to Linezolid.

Acharya et al (2015) conducted a study in Nepal. Discernible growth was seen in 30.5% samples. Difference between culture positivity rate was not significant between diabetics and non-diabetics. Most predominant organism was *E. coli* (64.5% in diabetics and 66.7% non-diabetics). *Klebsiella* was positive in 22.6% diabetics and 12.5% non-diabetics). *E. coli* showed sensitivity to gentamicin and nitrofurantoin. Other drugs showing sensitivity were cotrimoxazole, norfloxacin and ciprofloxacin. Ampicillin and cephalexin showed least sensitivity. *E. coli* showed similar sensitivity among diabetics and non-diabetics.<sup>[11]</sup>

Jha et al (2014) assessed urine culture of 462 diabetic patients in Nepal. The prevalence of UTI was 54.76%. The commonest age group affected was 31-40 yrs. *E. coli*, *Klebsiella*, *Proteus* and *Enterococcus* were the common organisms isolated. Amikacin showed highest sensitivity for Gram negative ones while Nitrofurantoin was effective against Gram positive ones. Ampicillin, nalidixic acid and ciprofloxacin showed high resistance. They opined that in diabetics, UTI is prevalent. They recommended that screening of diabetics is essential for adequate care.<sup>[12]</sup>

Bhagat et al (2020) reported UTI being important coinfection in diabetics. Various studies showed *E. coli* being prevalent organism causing UTI. Some studies reported *Staphylococcus* to be prevalent. According to them, most organisms were susceptible to commonly used antibiotics.<sup>[13]</sup>

Chand et al (2021) conducted study of UTI in diabetics. UTI was seen in 36% diabetics. Females were affected more (38.46 %) as compared to males (31.42%). *E. coli* (52.70%), *Klebsiella* (19.44%), *Pseudomonas* (08.33%), *Enterococcus* (08.33%), *Staph. aureus* (05.55%), *Proteus mirabilis* (02.77%) and CONS (02.77%) were isolated. Imipenem was most effective for gram negative organisms and Linezolid for gram positive ones.<sup>[14]</sup> Kande et al (2021) found the prevalence of UTI to be 75.4%. *E. coli* (25.6%), *Enterococcus* spp. (18.7%), and *Klebsiella* spp. (8.1%) were the common organisms seen. Nitrofurantoin (80.8%), gentamicin (76.8%), and amikacin (72.1%) were effective. Risk of UTI was higher in females with diabetes and those with HbA1c >9%. They concluded that isolation and antibiotic testing of uropathogenic bacteria is vital in diabetics with UTI.<sup>[15]</sup>

Kiranmala et al (2019) observed that in T2DM patients with UTI, *E. coli* predominated and was sensitive to meropenem, netilmicin, amikacin and nitrofurantoin. However, despite having low sensitivity, ceftriaxone was commonly used.<sup>[16]</sup> Jayadeswari et al (2020) also found that *E. coli* to be the commonest one apart from *Klebsiella* spp. It was sensitive to nitrofurantoin while resistance was seen for many drugs including ampicillin and ciprofloxacin. Most of the diabetics had good control of blood sugar.<sup>[17]</sup> The present study re-emphasizes that the prevalence and antibiotic sensitivity of pathogens in diabetics with UTI is similar as seen in other studies.

**CONCLUSION:**

UTI was seen in 39 % of the diabetics. *E. coli*, *Enterococcus* spp., and *Klebsiella* spp. were the most commonly isolated organisms. Amikacin, imipenem and linezolid were the antibiotics to which these were most sensitive. Females, those with poor diabetes control and those with hypertension had higher risk of UTI. Due to rampant use of antibiotics and emergence of drug resistant strains, isolation and antimicrobial sensitivity testing of uropathogens is vital in diabetics with UTI.

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