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IP International Journal of Medical Microbiology and Tropical Diseases

Journal homepage: <https://www.ijmmttd.org/>

## Original Research Article

## Prevalence of uropathogens among diabetic patients and their antibiogram at government medical college, Kota

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## ARTICLE INFO

## Article history:

Received 12-03-2021

Accepted 17-03-2021

Available online 26-03-2021

## Keywords:

Urinary tract infection

Uropathogen

Diabetic patients

## ABSTRACT

Urinary tract infections (UTI) are very often encountered in patients with diabetes mellitus. Emergence of resistant bacterial strains in UTI increases the cost of treatment, morbidity and mortality in diabetic patients.

**Aims & Objectives:** The study was aimed to determine the prevalence of UTI in diabetic patient and antimicrobial sensitivity of causative agents for early treatment to reduce morbidity and mortality.

**Results:** Urine samples were taken from 100 proved diabetic patients attending Diabetic Clinic at NMCH, Kota and were subjected to culture and antibiotic susceptibility during September 2018 to August 2019. The overall prevalence of UTI in diabetics was (36%) with female predominance of (38.46 %) and in male with (31.42%). The UTI was common in age group between 20-40 years. E. coli (52.70%) was the most predominant bacterial isolate followed by Klebsiella (19.44%), Pseudomonas (08.33%), Enterococcus (08.33%), Staph. aureus (05.55%), Proteus mirabilis (02.77%) and CONS (02.77%). The most sensitive drug in our study was Imipenem followed by Amikacin for gram negative isolates. All the gram positive isolates were sensitive to Linezolid.

**Conclusion:** This study provides a baseline data of current scenario of UTI in diabetic patient in our set up which can be utilized to formulate infection control strategies. An on-going study would be beneficial to maintain a track of the UTI prevalence in diabetic patients.

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## 1. Introduction

Diabetes Mellitus has a number of effects on genitourinary system. Patients with diabetes are at increased risk for Urinary tract infection.<sup>1,2</sup> Urinary Tract Infection is more common in diabetes because of a combination of host and local risk factors. Under some circumstances urine may be inhibitory or even bactericidal against uropathogens. Modification of chemical composition of urine in diabetes mellitus can alter the ability of urine and support the growth of microorganisms. Autonomic neuropathy in diabetes mellitus impairs bladder emptying and subsequent urological manipulation predispose to Urinary Tract Infections.<sup>3-5</sup>

E. coli is the most common bacterial pathogen causing urinary infection in patients with diabetes, other organisms being Klebsiella pneumoniae and Proteus mirabilis.<sup>6</sup> Pseudomonas aeruginosa should be suspected if there is a history of recent instrumentation or Hospitalization.

## 2. Materials and Methods

A total of 100 diabetic patients were studied for a period of one year. Clean voided midstream urine samples were collected in sterile containers after giving proper instructions and samples were processed in the laboratory within 2 hours of collection. Urine cultures were done by inoculating urine samples on blood agar and MacConkey agar plates using a calibrated loop (0.001ml) and incubated at 37 C for 18-24 hours. Those culture reports were considered positive who had colony forming units more than

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$10^5$  /ml of voided urine. The pathogens were isolated and biochemical tests were done for identifying the species of the pathogens.<sup>7</sup> Antimicrobial sensitivity testing for isolates was carried out by Kirby Bauer disc diffusion method on Muller Hinton agar. Results were interpreted in accordance with central laboratory standards institute guide-lines.<sup>8</sup>

### 3. Results

Urine samples were taken from 100 proved diabetic patients attending Diabetic Clinic at NMCH, Kota and were subjected to culture and antibiotic susceptibility during September 2018 to August 2019. The overall prevalence of UTI in diabetics was (36%) with female predominance of (38.46%) and in male with (31.42%). The UTI was common in age group between 20-40 years. *E. coli* (52.70%) was the most predominant bacterial isolate followed by *Klebsiella* (19.44%), *Pseudomonas* (08.33%), *Enterococcus* (08.33%), *Staph. aureus* (05.55%), *Proteus mirabilis* (02.77%) and *CONS* (02.77%).

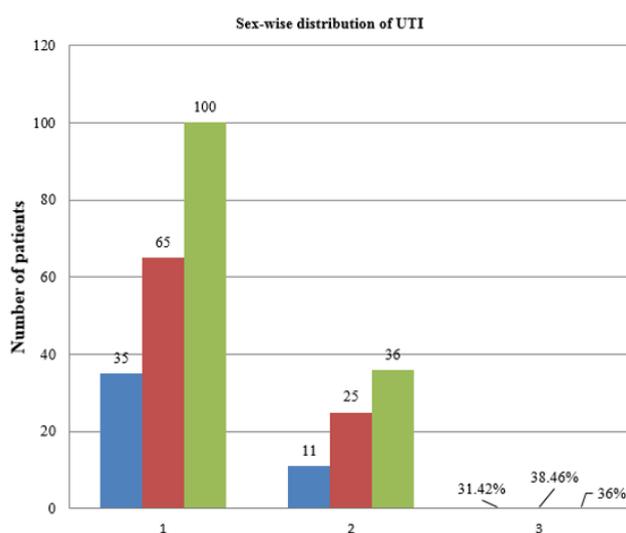


Fig. 1: Sex-wisedistribution of UTI

The most sensitive drug in our study was Imipenem followed by Amikacin for gram negative isolates. All the gram positive isolates were sensitive to Linezolid.

### 4. Discussion

In our study the overall UTI prevalence was found to be 36%, which is similar to study done by Acharya D et al<sup>9</sup> (34.50%) and MaySewify et al<sup>10</sup> (34.90%). and Praveen kumar et al<sup>11</sup> (40%). Whereas study done by Hiwot Ketema et al<sup>12</sup> (14.90%) and Worku et al<sup>13</sup> (10.90%) showed much lower prevalence. The variation in prevalence of UTI may be due to difference in selection criteria for study population, geographical variations and difference in screening tests used.

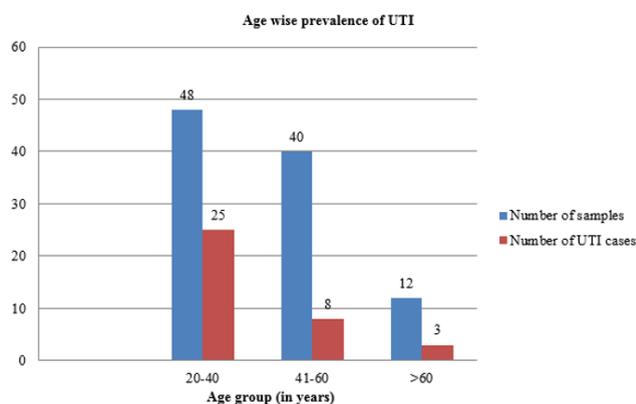


Fig. 2: Agewise prevalence of UTI

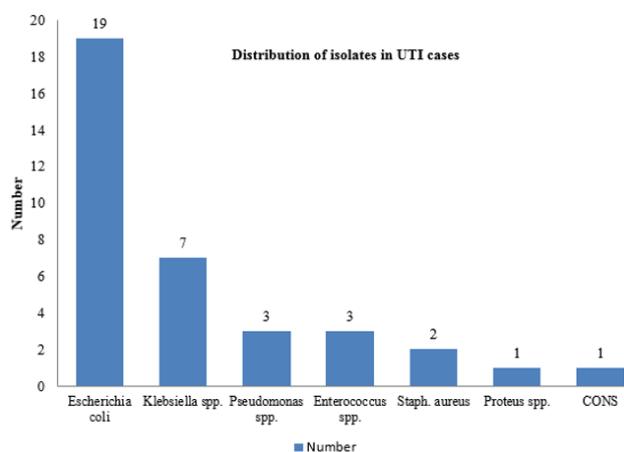


Fig. 3: Distribution of isolates in UTI cases

In our study the prevalence was seen to be higher in patients belonging to 20-40 years of age group. Similar results have been reported by Khushbu et al<sup>14</sup> and Demiss et al.<sup>15</sup> This may be explained by the fact that this age group is sexually active which makes them more susceptible for UTI.

Of the 36 patients who had UTI 11(31.42%) were male and 25(38.46%) were female. The prevalence of UTI in female was high which is supported by the study done by BV Ramana et al<sup>16</sup> (43.00% were male and 46.00% were female) and by Praveen et al<sup>(11)</sup> (31.09% were male and 48.09% were female). The prevalence of UTI is higher in women because of short & wide urethra, proximity of urethra to anus and may be due to poor hygienic conditions.

The our study showed that *Escherichia coli* was the most common isolate (52.7%), followed by *Klebsiella* spp. (19.44%). Similar findings were reported by BV Ramana et al<sup>16</sup> where *Escherichia coli* was the commonest (51.8%) organism causing UTI followed by *Klebsiella* spp. (17.5%) and Dhandapany et al<sup>17</sup> where *Escherichia coli* was the commonest (54.00%) followed by *Klebsiella* spp. (21.00%).

**Table 1:** Antimicrobial sensitivity pattern of Gram negative isolates

S. No.	Antibiotic	Escherichia coli (N=19)	Klebsiella spp. (N=7)	Pseudomonas spp. (N=3)	Proteus mirabilis (N=1)
1.	Amikacin	18(94.73%)	4(57.14%)	2(66.67%)	1(100%)
2.	Imipenem	17(89.47%)	6(85.71%)	3(100.00%)	1(100.00%)
3.	Ciprofloxacin	6(31.57%)	3(42.85%)	1(33.33%)	0(0.00%)
4.	Norfloxacin	12(63.16%)	5(71.42%)	2(66.67%)	1(100%)
5.	Nitrofurantoin	16(84.21%)	6(85.71%)	1(33.33%)	0(0.00%)
6.	Cefotaxime	13(68.42%)	2(28.57%)	1(33.33%)	0(0.00%)
7.	Ampicillin	1(5.26%)	0(0.00%)	1(33.33%)	0(0.00%)

**Table 2:** Antimicrobial sensitivity pattern of Gram positive isolates

S. No.	Antibiotic	Enterococcus spp. (N=3)	Staph.aureus (N=2)	CONS (N=1)
1.	Ampicillin	2(66.67%)	0(00.00%)	0(00.00%)
2.	Ciprofloxacin	3(100.00%)	1(50.00%)	0(00.00%)
3.	Gentamicin	3(100.00%)	1(50.00%)	1(100.00%)
4.	Amoxicillin-clavulanic acid	2(66.67%)	1(50.00%)	1(100.00%)
5.	Clindamycin	2(66.67%)	1(50.00%)	1(100.00%)
6.	Linezolid	3(100.00%)	2(100.00%)	1(100.00%)
7.	Cefotaxime	0(00.00%)	1(50.00%)	0(00.00%)

The isolation of *Escherichia coli* as a primary uropathogen might be explained by its high affinity to adhere in the uroepithelial cells compared with other organisms, due to the presence of different virulence factors.

*Escherichia coli* isolates were most sensitive to Amikacin (94.73%), Imipenem (89.47%) and Nitrofurantoin (84.21%). Similar sensitivity pattern of *Escherichia coli* for antibiotics was observed by Dorin et al,<sup>18</sup> Vishal et al,<sup>19</sup> and Dhandapany et al.<sup>17</sup>

In our study the most frequently isolated gram positive organism was *Enterococcus spp.*(08.33%). It was 100.00% sensitive for Linezolid, Ciprofloxacin and Gentamicin. All *Enterococcus spp.* isolates were resistant to Cefotaxim.

Similar sensitivity pattern of *Enterococcus spp.* For various antibiotics was observed by Dorin et al.<sup>18</sup> Praveen et al<sup>11</sup> and Hiwot et al.<sup>12</sup>

The extent of antimicrobial susceptibility of various bacterial strains depends on the therapeutic practice in the particular region.

## 5. Conclusions

This study provides a baseline data of current scenario of UTI in diabetic patients in our set up which can be utilized to formulate infection control strategies. An ongoing study would be beneficial to maintain a track of the UTI prevalence in diabetic patients.

## 6. Conflicts of Interest

All contributing authors declare no conflicts of interest.

## 7. Source of Funding

None.

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**Cite this article:** Chand AE, Goyal SR, Naruka HS. Prevalence of uropathogens among diabetic patients and their antibiogram at government medical college, Kota. *IP Int J Med Microbiol Trop Dis* 2021;7(1):24-27.