

**Original Article**

**A PROSPECTIVE OBSERVATIONAL STUDY ON PREVALENCE AND TREATMENT OF URINARY TRACT INFECTIONS IN A TERTIARY CARE TEACHING HOSPITAL IN TELANGANA STATE**

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**ABSTRACT**

**Objective:** To study the Prevalence of urinary tract infections and related risk factors and to study the Management of urinary tract infections.

**Methods:** This was a prospective observational study conducted in General Medicine Department, Osmania General Hospital (OGH), a tertiary care teaching hospital in Telangana State, where patients presenting or highly suspicious of having UTIs were included in the study. Pregnant women, Children, Patients who are not willing to participate were excluded from the study. Data was collected in predesigned Data collection forms.

**Results:** Over a period of 6 Mo a total of 75 UTI cases were observed in General Medicine Department of OGH, which included 33 Males, and 42 Females. High prevalence of UTI were observed in Females in the middle age group i.e. 31-45 y, whereas in Males, in senior adult group i.e., >60 y. The age group 18-30 y have shown the dominance of Uncomplicated UTIs (19%) and Primary UTIs (17%) and the age group >60 y have shown the dominance of Complicated UTIs (25%) and Recurrent UTIs (23%). The most common causative organism was found to be E. coli (69.3%). It was confirmed that the most common risk factor was found to be Diabetes Mellitus, followed by Hypertension and Chronic Kidney Disease. The most common antibiotic prescribed for UTI was Piperacillin+Tazobactam and for fungal UTIs, an antifungal drug i.e., Fluconazole was prescribed.

**Conclusion:** E. coli are the major cause of UTIs among patients It is discovered that UTI is common among females. Hospitalisation, married individuals, Diabetes mellitus, genitourinary tract abnormalities, congestive cardiac failure, hypertension, prostatitis and female gender are the most important risk factors of UTIs. Appropriate measures may help to reduce UTIs due to these associated factors.

**Keywords:** Pyelonephritis, Symptomatic asymptomatic bacteremia, Cystitis

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**INTRODUCTION**

Urinary tract infection (UTI) remains the most common infection worldwide, which can occur in any time in the life of an individual. UTI can affect both lower and upper urinary tract. It may be acquired from community or hospital. Common clinical symptoms of UTI include burning sensation during urination, pain above pubic bone, cloudy urine, foul smell of urine, fever, urgency and frequency of urination increased back pain, vomit, etc. Urinary tract infection is a common problem despite age and sex worldwide [1].

Clinically, UTIs are categorized as uncomplicated or complicated. Uncomplicated UTIs typically affect individuals who are otherwise healthy and have no structural or neurological urinary tract abnormalities; these infections are differentiated into lower UTIs (cystitis) and upper UTIs (pyelonephritis). Complicated UTIs are defined as UTIs associated with factors that compromise the urinary tract or host defence, including urinary obstruction, urinary retention caused by neurological disease, immunosuppression, renal failure, renal transplantation, pregnancy and the presence of foreign bodies such as calculi, indwelling catheters or other drainage devices. UTIs are caused by both Gram-negative and Gram-positive microorganisms, as well as by specific parasites. The most common causative agent for both uncomplicated and complicated UTIs is uropathogenic *Escherichia coli* (UPEC). For the agents involved in uncomplicated UTIs, UPEC is followed in prevalence by *Klebsiella pneumoniae*, *Staphylococcus saprophyticus*, *Enterococcus faecalis*, Group B *Streptococcus* (GBS), *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Candida* spp. For complicated UTIs, the order of prevalence for causative agents, following UPEC as most common, is *Enterococcus* spp., *K. pneumoniae*, *Candida* spp., *S. aureus*, *P. mirabilis*, *P. aeruginosa* and GBS [2].

Urinary tract infection is a common contagion among both genders, with higher prevalence among women due to their physiology and

pregnancy enhances the occurrence of the infection due to a variety of physiological changes during the course of pregnancy. In addition, age is an important factor where elderly people with urinary devices like catheters are prone to the infection. Patients undergoing long term treatment are also vulnerable to the infection due to moist hospitalized conditions. In addition, diabetes enhances the incidence due to elevated blood sugar levels and other factors like parity, gravidity, hormonal imbalance, immunosuppressant and geographical location also has a significant role in the incidence of the infection [3].

The etiology of UTI is also affected by underlying host factors that complicate UTI, such as age, diabetes, spinal cord injury, or catheterization. Consequently, complicated UTI has a more diverse etiology than uncomplicated UTI, and organisms that rarely cause disease in healthy patients can cause significant disease in hosts with anatomic, metabolic, or immunologic underlying disease. Etiologic pathogens associated with UTI among patients with diabetes include *Klebsiella* spp., Group B streptococci, and *Enterococcus* spp., as well as E coli. Patients with spinal cord injuries commonly have E coli infections. Diabetic patients by and large appear to have a twofold to fourfold expanded frequency of bacteriuria, prompting a higher rate of pyelonephritis [4].

A urine specimen for culture and susceptibility testing be obtained before instituting antimicrobial therapy. Therapy for the individual patient must be balanced with the possibility that antimicrobial use will promote further resistance. Antimicrobial therapy should be avoided unless there is a clear clinical indication. In particular, asymptomatic bacteriuria should not be treated with antimicrobials. Where symptoms are mild or equivocal, urine culture results should be obtained before initiating therapy. This permits the selection of specific therapy for the infecting organism and avoids empiric, usually broad-spectrum, therapy. Where empirical therapy is necessary, prior infecting organisms should be isolated, and recent

antimicrobial therapy, as well as regional or facility susceptibility patterns, should be considered in antimicrobial choice. Where empirical therapy is used, it should be reassessed 48 to 72 h after initiation, once pretherapy cultures are available [5].

Present study was aimed at finding the prevalence of UTIs and observe risk factors associated with urinary tract infections, common causative organisms of UTIs and to observe the management of urinary tract infections in the study population.

#### MATERIALS AND METHODS

This was a Prospective observational study approved by Institutional Ethics Committee (Reg No. MCP/IEC/PD/PR/61). The study conducted for a period of six months in which 75 patients with clinical features of Urinary tract infections attending General Medicine Department in Osmania General Hospital, a tertiary care teaching hospital in Hyderabad, Telangana State were enrolled in the study.

#### Selection Criteria

##### Inclusion criteria

- All patients attending General Medicine Department.
- Patients above 18 y of age.

- Patients of either sex.
- Patients with all co-morbidities.

##### Exclusion criteria

- Pregnant women
- Children
- Patients who are not willing to participate

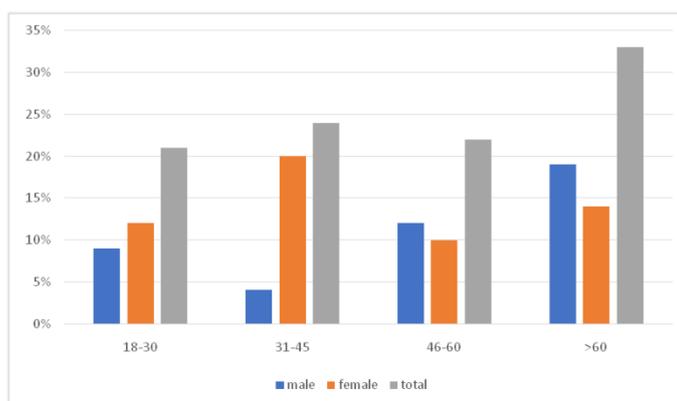
All the information from each case was recorded in specially designed forms regarding the demographic data, clinical signs and symptoms, culture sensitivity test, co-morbidities, drugs prescribed and assessed for prevalence and management of UTI. Data was analysed by descriptive statistical analysis.

#### RESULTS

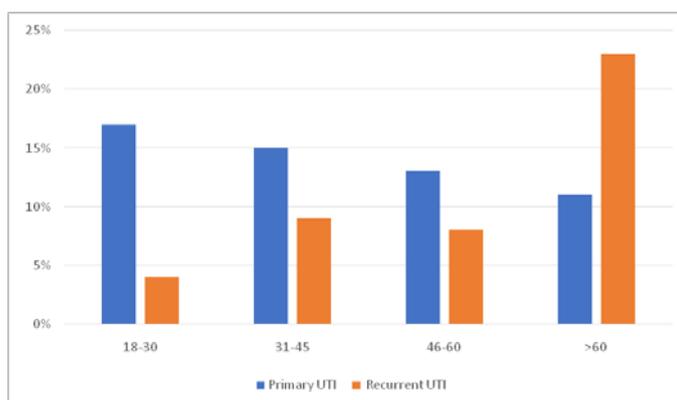
Over a period of 6 Mo a total of 75 UTI cases were observed, in General Medicine Department of OGH. Total of 75 cases have shown the symptoms of UTI, of which 42 were females (56%) and 33 were males (44%). The table 1 and fig. 1 represent the high prevalence of UTI in females than in males. In females the prevalence is seen in the age group 31-45 y and in males it is seen in age group >60 y.

**Table 1: Age and sex prevalence of UTI**

Age group in years	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
18-30	7	9%	9	12%	16	21%
31-45	3	4%	15	20%	18	24%
46-60	9	12%	7	10%	16	22%
>60	14	19%	11	14%	25	33%
Total	33	44%	42	56%	75	100%



**Fig. 1: Age and sex prevalence of UTI**



**Fig. 2: Categorization of UTI based on occurrence, the age group 18-30 y have shown the dominance of primary UTIs and the age group >60 y have shown the dominance of Recurrent UTIs (table 2 and fig. 2).**

Table 2: Categorization of UTI based on occurrence

Age group	No. of primary UTI cases	%	No. of recurrent UTI cases	%
18-30	13	17%	3	4%
31-45	11	15%	7	9%
46-60	10	13%	6	8%
>60	8	11%	17	23%

Table 3: Categorization of UTI based on severity

Age (years)	No. of complicated cases	%	No. of uncomplicated cases	%
18-30	2	3%	14	19%
31-45	8	11%	10	13%
46-60	11	14%	5	7%
>60	19	25%	6	8%

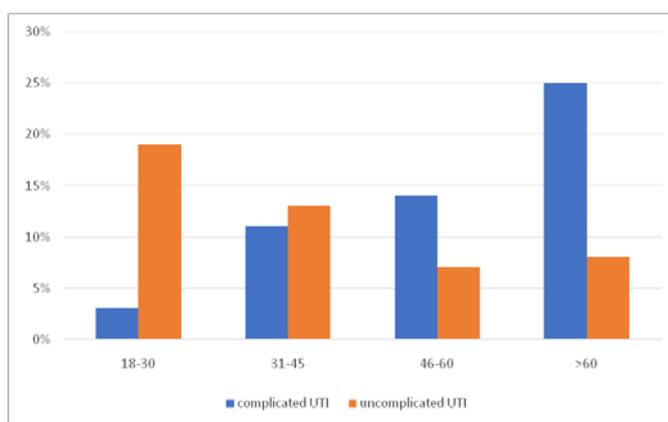


Fig. 3: Categorization of UTI based on severity, the table 3 and fig. 3 represent the dominance of complicated UTI s in the age group >60 y and the dominance of uncomplicated UTIs in the age group 18-30 y

Table 4: Causative organism of UTI

S. No.	Causative organism	Category	Number of cases	Percentage
1	<i>Escherichia coli</i>	gram-ve bacteria	52	69.3%
2	<i>Staphylococcus aureus</i>	gram+ve bacteria	8	10.6%
3	<i>Klebsiella sps</i>	gram-ve bacteria	5	6.7%
4	<i>Candida sps</i>	Fungi(yeast)	4	5.4%
5	<i>Pseudomonas species</i>	gram-ve bacteria	4	5.4%
6	<i>Citrobacter koseri</i>	gram-ve bacteria	2	2.6%

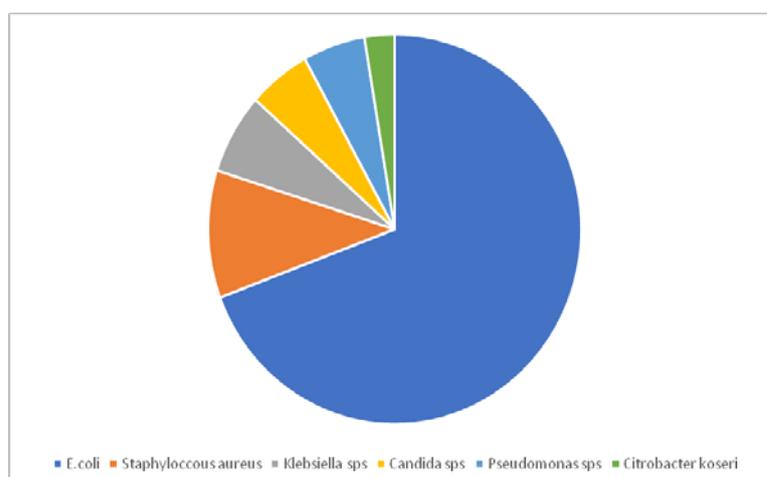


Fig. 4: Causative organism of UTI, the most common causative organism was found to be *E. coli* (69.3%). It is a gram-negative bacterium. Second most common organism was *Klebsiella species* followed by *Staphylococcus aureus*, a gram-positive organism. Apart from bacterial species, a fungal species, *Candida* was reported (table 4 and fig. 4).

Table 5: Categorization based on risk factor

S. No.	Risk factors	No. of cases
1	Diabetes Mellitus	43
2	Hypertension	38
3	Chronic Kidney Disease	24
4	Smoker	20
5	Alcoholic	13
6	Congestive Cardiac Failure	8
7	Prostatitis	5
8	Respiratory Infection	4
9	Dengue	2
10	HIV	2

From table 5, we can conclude that the most common risk factor was found to be Diabetes Mellitus followed by Hypertension, chronic kidney disease, smoking and alcoholism as other major risk factors.

Table 6: Pharmacological treatment

	Causative organism	Drug treatment
1	<i>E. coli</i>	Piperacilin+tazobactum, metronidazole, ceftriaxone, cefixime
2	<i>Klebsiella species</i>	Piperacillin+tazobactum, metronidazole, disodium hydrogen citrate, ciprofloxacin.
3	<i>Pseudomonas species</i>	Piperacillin+tazobactum, levofloxacin.
4	<i>Staphylococcus aureus</i>	Ceftriaxone, meropenem.
5	<i>Citrobacter koseri</i>	Ofloxacin, metronidazole, ceftriazone.
6	<i>Candida species</i>	Fluconazole, ciprofloxacin, Disodium hydrogen citrate.

Table 6 represents the drugs prescribed for UTI. Most common antibiotic used were piperacillin+tazobactum and Fluoroquinolones. For *Candida* species (fungi) antifungal drug i.e., Fluconazole was prescribed.

## DISCUSSION

The current study was conducted on 75 patients in a tertiary care teaching Hospital. Among 75 patients who were diagnosed with UTI, the males were 44% which is marginally lower than the percentage of females 56%. The reason for higher percentage in women may be due to the shorter length of the Urethra, which allows relatively easy passage of the bacteria into the bladder. Earlier studies have confirmed the increased percentage of UTIs in females than in males.

In a study conducted by John MS *et al.*, 2015 [6], there is a prevalence of UTI in females (91.6%) than in males (40.3%). This is in accordance with our study and also in a study conducted by, Prakash *et al.*, 2013 [7], which reported the prevalence of UTI higher in females (73.57%) than in males (35.14%). In contrast, the study conducted by Faryabi *et al.*, 2014[8] found that UTI is more Prevalent in Males (85.7%)

In our study Maximum number of patients with primary UTI were found to be in the age group of 18-30 y. In a study conducted by Nishant Aggerwal *et al.*, 2021[9] similar results were found. The maximum patients with Recurrent UTI were found to be in the age group of >60 y. The high incidence of UTI in male senior citizens or people above 60 y of age is closely linked to diabetes and prostrate conditions. The similar results are shown in the study conducted by Christy VR *et al.*, 2019 [10].

Uncomplicated Urinary tract infection caused by uropathogenic strains causing bacterial infection, particularly *E. coli* is the most common causative agent. The other common organisms are *Klebsiella*, *Enterobacteriaceae*, *Proteus* and *Enterobacter species* [12] Among the causative organisms, we found the prevalence of Gram-negative bacteria 84% followed by Gram-positive bacteria 10.6% and fungi were found to be 5.4 %. The most prevalent uropathogenic bacteria were *Escherichia coli* (70%) followed by *Klebsiella pneumoniae* (11%). Findings of Prakash D *et al.*, 2013 [7] found the prevalence of Gram-negative bacteria with 90.32%, which is more than Gram positive 9.68%, while Ullah A *et al.*, 2018 [11] has reported Gram-negative bacteria 79.3% and Gram-positive 20.7%, which is also in accordance with our study. In a study conducted by L P, Babu *et al.*, 2017[13] have reported *E. coli* in 60%, *Proteus* in 20%, *Klebsiella* in 13.33 % and *Pseudomonas* in 6.66% of the cases. They have also emphasized the need for periodic monitoring of antibiotic sensitivity patterns of the bacterial isolates to provide

effective treatment and thereby to make it more cost-effective, particularly in developing countries like India.

The high incidence of UTI in people above 60 y of age is closely linked to diabetes and prostrate conditions. In our study, we found that the most common Risk factor for UTI are Age, Gender, and Comorbidities like Diabetes mellitus and Hypertension. In a study conducted by Chaturvedi *et al.*, 2022 [14] UTI was more common in senior males (above 40 y) (12%), due to prostatic hypertrophy and catheterized patients (19%) with age ≤40 y of age are more prone to UTIs.

Piperacillin/tazobactam at a dosage of 4g/0.5g every 8 h was administered as IV infusion to patients with UTI. Short-course therapy (3-day therapy) with trimethoprim-sulfamethoxazole or a fluoroquinolone (e. g., ciprofloxacin, levofloxacin, or norfloxacin) is superior to single-dose therapy for uncomplicated infections and should be the treatment of choice. Amoxicillin or sulfonamides are not recommended because of the high incidence of resistant *E. coli*.

Follow-up urine cultures are not necessary in patients who respond. In seriously ill patients, the traditional initial therapy has included an IV fluoroquinolone, an aminoglycoside with or without ampicillin, or an extended-spectrum cephalosporin with or without an aminoglycoside. If the patient has been hospitalized in the last 6 mo, has a urinary catheter, or is in a nursing home, the possibility of *P. aeruginosa* and *Enterococci* infection, as well as multiply resistant organisms, should be considered. In this setting, ceftazidime, ticarcillin-clavulanic acid, piperacillin, aztreonam, meropenem, or imipenem, in combination with an aminoglycoside, is recommended. If the patient responds to initial combination therapy, the aminoglycoside may be discontinued after 3 d.

## CONCLUSION

In this study, the cases of UTIs in patients attending Osmania General Hospital over a period of 6 mo were studied. Out of 75 cases studied, 33 were Males and 42 were females; hence Prevalence was found to be more in females. In females high prevalence is seen among the middle age group (31-45years) and in males high prevalence is seen among Senior adult group (>60 y). The most common causative organism was found to be *E. Coli* which accounts for 69.3% of UTIs of all cases. It is a gram-negative bacterium. Second most common organism was *Staphylococcus aureus*, a gram-

positive organism, followed by *Klebsiella* spp. Apart from Bacterial spp, a fungal species *Candida* was reported. Primary infection cases (17%) and uncomplicated UTI cases (19%) were common in age group 18-30 y, whereas recurrent cases (23%) and complicated UTI cases (25%) were common in elderly >60 y. Piperacillin+Tazobactam and Fluconazole have commonly prescribed drugs. This study has demonstrated that DM, hypertension, chronic kidney disease, Smoking, Alcoholism, Congestive cardiac failure, Prostatitis and female gender are the most important factors associated with UTIs.

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Nil

#### AUTHORS CONTRIBUTIONS

All the authors Dr. Syeda Rana Nikhat, Juveyria Kareem, Asma Lateef, Syeda Ruhi Fatima, and Dr. Rafia Sultana, have equally made a substantial contribution in the conception, acquisition of data, interpretation of data, and in drafting the article and agreed to be held accountable for all aspects of the work.

#### CONFLICT OF INTERESTS

There was no conflict of interest in this work.

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