

Clinical Profile and Outcome in Patients of Complicated Urinary Tract Infections: A Prospective Observational Study**Mohammed Tarik¹, Sonal Agarwal², Amit Sagar³, Pratima Chouhan⁴**¹Associate professor, Department of Medicine, Geetanjali Medical College and Hospital, Udaipur²Associate Professor, Department of Pathology, RVRS Govt. Medical College, Bhilwara, Rajasthan³Associate professor, Department of Medicine, Dr S N Medical College, Jodhpur⁴Associate professor, Department of Medicine, Dr S N Medical College, Jodhpur

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Abstract:

Introduction: Urinary Tract Infections are the bacterial infection of the urogenital organs having risk of complications like urosepsis & septic shock. The complications become fatal if left untreated for a long time. Thus an early diagnosis of the Complicated Urinary Tract Infections along with aggressive management with empirical antibiotics is necessary to prevent mortality.

Aims & Objectives: The present prospective observational study was aimed to study the clinical profile & outcomes in patients of complicated urinary tract infections.

Material & Methods: This prospective study recruited 100 patients from March 2021 till December 2021 having symptoms of urinary tract infections. All the patients were followed up for 1 month. A detailed medical history & physical examination was conducted for all the patients. Investigations done at baseline and at regular intervals were complete blood counts, renal function tests; urine routine, urine cultures, and blood cultures were done. Ultrasound abdomen & noncontract computed tomography of the kidneys and urinary bladder were done. Parameters recorded were antibiotics used, any surgery required, requirement for renal replacement therapy, intensive care, length of hospitalisation & outcome were recorded.

Results: Majority i.e. 52% of the patients were in 50-70 years age range with mean age of 61.6 ± 15 yrs. Diabetes was observed in 55%, Hypertension in 47%, smoking 31%, alcohol 28%, coronary artery disease 15%, chronic kidney disease 17%, Thyroid 4% & previous urinary infections in 4%. The clinical presentation included fever in 94%, flank pain in 37%, dysuria in 30%, costovertebral angle tenderness in 21%, suprapubic pain in 4% & hematuria in 2%. Urine culture growths noted E. coli being the commonest microorganism. The microorganisms were highly susceptible to Colistin/ Polymyxin, Imipenem, and Meropenem. The mean duration of hospital stay was 8.7 ± 1.9 days. About 36% cases required intensive care & 5% needed invasive ventilation. One month follow-up observed recovery in 97% of the cases while 3% cases collapsed.

Conclusion: Complicated urinary tract infections have been observed to be significantly higher in diabetic patients followed by hypertension with E. coli being the most commonly isolated pathogen. Timely medical intervention & some patients may require intensive care to prevent severe complications & mortality. Antibiotics should be administered on the basis of culture sensitivity reports to prevent antimicrobial resistance.

Keywords: Urinary Tract Infections, Diabetes mellitus.

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Introduction

Urinary tract infections (UTI) are the most common cause of pyrexia observed in general practice. UTI is described as a bacteriuria with or without urinary symptoms. [1] Complicated urinary tract infections (cUTI) can be seen in patients with structural or functional abnormalities of the genitourinary tract.

These may be obstruction; neurological impairment, urological abnormalities/ devices, immunological impairment, and congenital diseases. [2] Many microorganisms can also cause

complicate UTI along with resistance to broad-spectrum antibiotics. The commonest etiologic agent is Escherichia coli, others can be Enterobacter, Pseudomonas, Staphylococcus aureus, [3] candida. [2] The patients may present with burning micturition & pyrexia in some cases sepsis and septic shock may occur. In the elderly it may be accompanied by delirium. [4]

In a study by Mohapatra et al the prevalence rate of community acquired UTI was noted to be 10.1% with a rate of 12.8% among paediatric patients &

86.8% among adults. 85% of the pathogens were *E. coli* and *K. pneumoniae*. Risk factors were previous episodes of UTI and diabetes mellitus. [5] Also an increasing incidence of multidrug resistant UTI has been observed in both community & hospital settings. This increasing drug resistance was observed highest among the *E. coli* isolates. [6] Thus the present study was aimed to study the clinical profile & outcomes in Patients of Complicated Urinary Tract Infections.

Material & Methods

This prospective study recruited 100 patients from March 2021 till December 2021 having symptoms of UTI who came to the outpatient department of our tertiary care Hospital. Patients more than 18 years of age with symptoms suggestive of UTI like pyrexia, dysuria, increased frequency of micturition, flank pain, renal angle tenderness, suprapubic pain were included in the study.

All the patients were followed up for 1 month. Pregnant females, acute uncomplicated UTI were excluded. An institutional ethical clearance was sought and written informed consent was taken from all the patients. A detailed medical history & physical examination was conducted for all the patients. Investigations done at baseline and at regular intervals were Complete blood counts, renal function tests; urine routine, urine cultures, and blood cultures were done.

Ultrasound abdomen & noncontrast computed tomography of the kidneys and urinary bladder were done wherever required. Parameters monitored were antibiotics used, any surgery required, requirement for renal replacement therapy, intensive care, length of hospitalisation & outcome were recorded.

Statistical Analysis

The collected data was tabulated & put to statistical analysis. The data was presented as frequency and percentage. The data was expressed as mean & standard deviation. P-value <0.05 was considered statistically significant.

Results

This prospective study recruited 100 patients, 59 males and 41 females. Majority i.e. 52% of the patients were in 50-70 years age range with mean age of 61.6 ± 15 yrs. Diabetes was observed in 55%, Hypertension in 47%, smoking 31%, alcohol 28%, CAD 15%, CKD 17%, Thyroid 4% & previous urinary infections in 4%. These comorbidities were observed as a risk factors for the development of complicated UTI. (Fig 1) The clinical presentation included fever which was observed in 94%, flank pain in 37%, dysuria in 30%, costovertebral angle tenderness in 21%, suprapubic pain in 4% & hematuria in 2% of the complicated UTI patients. (Fig. 2) In the present study, urine culture growths observed a preponderance of gram negative organisms, out of which *Escherichia coli* being the commonest followed by *Klebsiella*, *Pseudomonas*, *Proteus*, *Acinetobacter* and *Citrobacter* group.

In the present study, the empirical antibiotics prescribed were carbapenems. The microorganisms were highly susceptible to Colistin/ Polymyxin, Imipenem, and Meropenem. Moderate sensitivity was observed with respect to Ertapenem, and Nitrofurantoin. Antibiotic resistance was observed for Piperacillin-tazobactam (74.4%) and cefoperazone- sulbactam (70.7%). (Table 1) The mean duration of hospital stay was 8.7 ± 1.9 days. About 36% cases required ICU & 5% needed invasive ventilation. One month follow-up observed recovery in 97% of the cases while 3% cases collapsed.

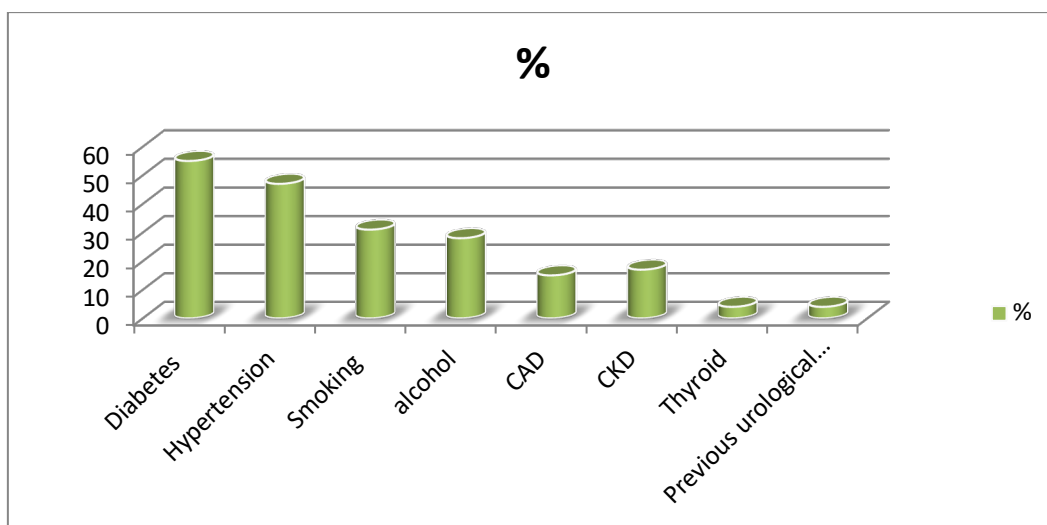


Figure 1: Risk factors and co-morbidities in complicated urinary tract infection

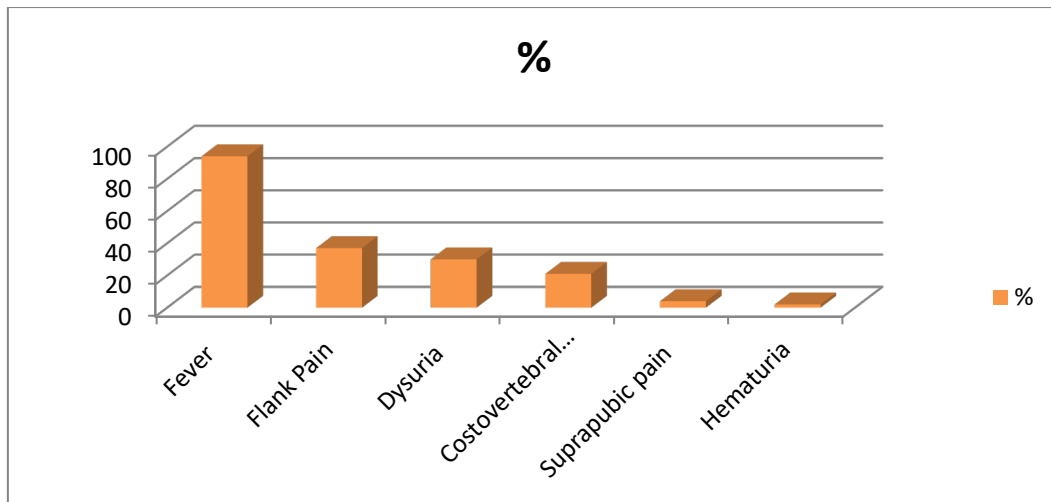


Figure 2: Clinical presentation in complicated urinary tract infection

Table 1: Antibiotic sensitivity pattern on urine culture

S. No.	Antibiotic Regimen	Sensitive	Resistant
1.	Colistin/Polymixin	100%	0
2.	Imipenem	88%	12%
3.	Meropenem	83%	17%
4.	Ertapenem	65%	35%
5.	Amikacin	78.5%	21.5%
6.	Nitrofurantoin	55%	45%
7.	Cefoperazone – sulbactam	29.3%	70.7%
8.	Piperacillin-tazobactam	25.6%	74.4%

Discussion

Usually UTI are uncomplicated infections, they become complicated when structural & functional deformities are present. In older age groups, UTI can cause sepsis & morbidity due to benign cystitis & pyelonephritis. 8 The present study focuses on epidemiology, risk factors, clinical features, microorganisms, antibiotic profile & outcome in UTI patients. UTI affects both genders, in 25-40 age group females are more affected due to the physiology of urinary tract. In elderly, associated comorbid diseases, with catheters, prolonged treatment with antibiotics/ hospitalization UTI is more common.

In the present study, majority i.e. 52% of the patients were in the age group of 50-70 years age range with mean age of 61.6 ± 15 yrs. similar findings have been observed in study by Mural et al, where most of the patients were in 60-69 years range. Whereas in a study by Dinesh et al, UTI was noted to be commoner in 31-45 years females. [10] In Jindal et al study, patients were mainly of 51-70 years, with a mean age of 58.8 ± 16 years, with male predilection. [11] Male predilection can be explained by the fact that in males UTI is generally considered complicated due to obstructive pathologies. Females have higher incidences of uncomplicated cystitis. [12] In the present study, the most common comorbid disease was DM followed by hypertension. Other risk factors

observed were smoking 31%, alcohol 28%, CAD 15%, CKD 17%, Thyroid 4% & previous urinary infections in 4%. Similarly, studies by Mural R et al [13], Pargavi et al [14] & Jindel et al [11] observed DM in 60%, 37% & 53% of the patients respectively. Mahesh et al study noted 42.6 % patients with a history of DM. The findings suggest that DM is one of the major risk factors of UTI as glycosuria acts as a forewarning .[15] Also, patients suffering from CKD, have an increased risk due to the disease factors like papillary necrosis, nephrolithiasis, neurogenic bladder & its management by Foley catheters and intravenous lines. [16]

In the present study, the common symptoms were fever 94%, flank pain 37%, dysuria 30%, costovertebral angle tenderness 21%, suprapubic pain 4% & hematuria 2%. Similar findings observed by Mahesh E et wherein fever was the commonest symptom followed by dysuria. In Mural R et al study the commonest symptom was burning micturition followed by urgency & increased frequency of micturition, which can be explained by the majority of the cases suffering from DM. [15]

In the present study , urine culture growths observed a preponderance of gram negative organisms, out of which E. coli being the commonest followed by Klebsiella, Pseudomonas, Proteus, Acinetobacter and Citrobacter group.

Accordingly, other studies having similar findings are Faryabi et al [16], Peterson et al [17], and Marques et al [18].

In Mural R et al study, gram negative microorganism accounted for 68.27%, *E. coli* (47.7%) followed by *K. pneumoniae* had the highest growth. Gram positive microorganisms accounted for 28% of isolates, mainly *Enterococcus* sps & *Staphylococcus* sps (MRSA; 3, *Staphylococcus aureus*; 2 and MSSA; 1). [13] In a study done in ICU patients, Bagshaw et al observed enterococci as the third most frequent uropathogens after *E. coli* and *Pseudomonas aeruginosa*. In the recent times, enterococci have become frequent findings due to prevalence of nosocomial infections. [19] In Jindal et al study, *E. coli* noted in 77 % of the cases followed by *Klebsiella pneumoniae*. *Candida* sp observed in 4% isolates. [11]

In the present study, the empirical antibiotics prescribed were carbapenems. The microorganisms were highly susceptible to colistin/ polymyxin, imipenem, and meropenem. Moderate sensitivity was observed with respect to ertapenem, and nitrofurantoin. Antibiotic resistance was observed for piperacillin-tazobactam (74.4%) and cefoperazone- sulbactam (70.7%).

Similar findings were observed by Jindal et al study. [11] Eshwarappa M et al noted profound sensitivity to carbapenems (96%) & comparable resistance to amikacin (28.0%) and nitrofurantoin (28.6%). [20] In Li X et al study, sensitivity to carbapenems & amikacin were observed with and high rates of resistance to penicillins (56%–94%), cephalosporins ($\geq 45\%$), aztreonam and ciprofloxacin. Thus, third generation cephalosporins were used as empirical treatment & antibiotics revised in 41.78% of cases. [21]

In the present study, the mean duration of hospital stay was 8.7 ± 1.9 days. About 36% cases required ICU & 5% needed invasive ventilation. One month follow-up observed recovery in 97% of the cases while 3% cases collapsed. Li X et al study, noted average length of hospitalisation to be 13 days with 2.5% mortality. [21] In Jindal et al study, 94% patients recovered well while mortality noted in 4% patients. [11]

Conclusion

Thus, an early diagnosis and aggressive treatment is the need of the hour for a successful outcome. Empirical use of antibiotics is necessary to prevent antibiotic resistance.

Escherichia coli was observed the most common pathogenic microorganism & with a high antimicrobial resistance. Patients treated with carbapenems show excellent recovery.

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