

Uncomplicated Urinary Tract Infection: Isolated bacteria, outcome and their susceptibility to antibiotics

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ABSTRACT

Background: : Urinary tract infection (UTI) remains a common clinical problem in both the community and health care associated settings. In Pakistan, this is also a common issue and each patient should be carefully assessed to ensure that a correct diagnosis is made and that antimicrobial therapy is appropriately prescribed. UTI is a common problem and it effect's both gender and all ages.

Objective: To determine typical symptoms of urinary tract infection locally employing urine test for diagnosis and outcome after use of antibiotics against isolated bacteria.

Methods: The cross-sectional descriptive, observational study was conducted at the department of emergency medicine, Ziauddin University Hospital, Karachi from June 2013 to November 2013. Adult patients of either gender with painful and/or frequent maturation were queried for symptoms (history) of urinary tract infection and underwent urine test. Clean catch mid stream urine was collected and the specimens were cultured for isolation of microbial agents of urinary tract infection. The isolated bacteria were identified using biochemical test. The diffusion susceptibility test was used to determine susceptibility of bacterial agents to antibiotics. Data was analyzed by descriptive statistics using SPSS software version 19.

Results: In this study, 251 (83.7%) out of 300 patients presented numerous (positive) leucocytes in urine detail report. For these 251 (83.7%) patients, the urine culture and sensitivity was performed. Out of these, E-coli was the most common bacteria found in about 150 (59.8%). The other bacteria are Pseudomonas 18 (7.2%), Proteus 37 (14.7%), Kabsella16 (6.4%), enterococcus 20 (8.0%), and staphylococcus aureus 10 (4.0%). Most of the patients were sensitive to cephalosporin's, amikacnine, and third generation cifixime and ceftrixon. The outcome of patient with appropriate antibiotics was higher at 97.3% for 5 days compared to 83.3% for 3 days.

Conclusion: Gram negative bacilli is responsible for urinary tract infection and most frequent isolated bacteria was E-coli. The most effective antibiotics are cepholine, amikacin, and third generation cefixem and ceftraxone in patients. Urinary tract infection occurs within 5 days in our local settings comparing to 3 days in developed communities which can enable emperical use antibiotics with typical symptoms of uncomplicated urinary tract infection for about 5 days in our community.

KEY WORDS: *Urinary Tract Infection, Isolated Bacteria, Empirical Antibiotics.*

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INTRODUCTION

Urinary tract infection (UTI) is an inflammatory response of the urothelium to bacterial invasion that is usually associated with bacteriuria and pyuria.¹ It is common clinical problem which can effects all age groups, but the women are more susceptible than men, due to several clinical factors including anatomic difference, hormonal effects and behavioral pattern.²

UTIs are classified as uncomplicated or complicated. Uncomplicated UTIs occurs in sexually active healthy patients with structurally and functionally normal urinary tracts. Complicated UTIs are those that are associated with co morbid conditions that prolong the need for treatment or increase the chance for therapeutic failure. These conditions include abnormalities of urinary tract that impede urine flow, the existence of a foreign body (e.g. indwelling catheter, stones), or infection with multidrug resistance pathogen. Despite involvement of upper urinary tract, pyelonephritis can be considered uncomplicated when it occurs in a healthy patients.^{2,3} Clinical manifestations can vary from asymptomatic bacterial colonization of bladder to irrigative symptoms such as frequency and urgency associated with fever, chills and flank pain, and bacteremia associated with severe morbidity including sepsis and death.⁴

Urinary tract infection may involve only the lower urinary tract or both the upper and the lower tracts. Acute uncomplicated cystitis, which is characterized by dysuria, frequent and/or urgent urination, bacteriuria, and pyuria, occurs primarily in healthy adult individuals with apparently normal urinary tract. Acute pyelonephritis describes clinical syndrome of chills, fever, and flank pain that is accompanied by bacteriuria and pyuria, a combination that is reasonably specific for an acute bacterial infection of the kidney. The microbiological findings associated with acute uncomplicated UTI are highly consistent: 55 – 60% of episodes are caused by *Escherichia coli*, and 5 – 15% is caused by *proteus*, *Enterococcus*, *Kabsella*,

Pseudomonas and *Staphylococcus aureus*. Uropathogens are assumed to originate primarily from the bowel flora; although other potential reservoirs have not been well studied (acute uncomplicated cystitis in an era of increase antibiotic resistance).⁵ Studies conducted in Iran suggested that *Ecoli* is the most common cause followed by *klebsiella*, *entrobacter* and others.¹² One of the studies conducted in India also suggest that the gram negative organisms like *E-coli* was the most predominant organism.¹³ The aim of this study was to isolate of pathogen agents involving uncomplicated UTI and determination of their antibiotics susceptibility and outcome of the patients referred to Ziauddin university hospital Karachi Pakistan.

METHODOLOGY

The study was carried out at the department of emergency medicine, Ziauddin University Hospital, Karachi, Pakistan. This study is a descriptive cross sectional observation study and no clinical trials are performed. Therefore as long as there is no breach of patient's data confidentiality, there is ethical issue involved. All patients with age greater than 18 with either gender, with urinary tract infection were included in the study. Patients with a history of genitourinary surgeries, recurrent urinary tract infection, or those already on antibiotics were excluded from the study. A total of 300 patients with symptoms of urinary tract infection were studied and underwent different diagnostics procedures and categorized into multiple isolated organism.

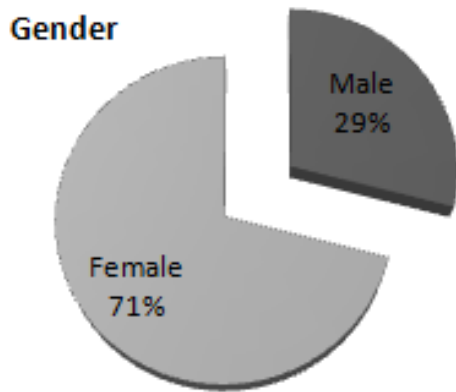
A database was completed using inpatients and outpatients medical records by an independent observer who was not the part of research team and/or inpatient care. Data collected included variables such as age, gender, isolated organisms and outcome in terms of days. Data was analyzed by descriptive statistics in term of frequencies, percentage and mean (+/-) standard deviation using statistical package for social science (SPSS) software version 19. The P value was collected by independent-sample T-

Test and statistical significance was defined as $p < 0.05$. An informed consent was taken from all patient and ethical procedures were followed. Data was delinked for patient identity and due care was taken for ensuring confidentiality of the records.

RESULTS

A total of 300 cases of UTI were included in the study. There were 87 (29%) males and 213 (71%) females.

Figure 1. Gender distribution amongst UTI patients



A total of 83.7% patients found with isolated organism and 16.3% with no bacteria. All those cases where no bacteria found were excluded from the study.

Table 1. Detection of bacteria in the sample population

Total Population		Leucocytes
No Bacteria	16.3%	N
Isolated Organism	83.7%	Y

The isolated organism is then further studied and e-coli were found to be the most common with 59.8% of the patients. Table 2 shows detail view of each organism's participation.

Table 2. Prevalence and incidence of isolated organisms

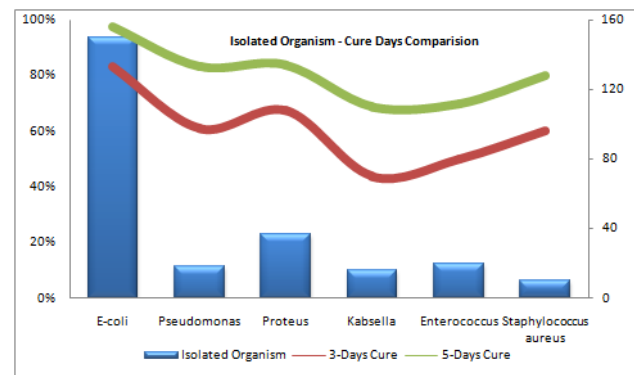
Isolated Organism	Total	Percentages
E-coli	150	59.8%

Pseudomonas	18	7.2%
Proteus	37	14.7%
Kabsella	16	6.4%
Enterococcus	20	8.0%
Staphylococcus aureus	10	4.0%
Grand Total	251	

Table 3. Summary of results of cure days analysis

Isolated Organism	# of cases	3-Days Cure	5-Days Cure
E-coli	150	37.3%	83.3%
Pseudomonas	18	27.8%	61.1%
Proteus	37	40.5%	67.6%
Kabsella	16	31.3%	43.8%
Enterococcus	20	25.0%	40.0%
Staphylococcus aureus	10	30.0%	50.0%

Figure 2. Trends and result summary for the cure day analysis



DISCUSSION

Urinary tract infection (UTIs) are the amongst commonest infections observed in a hospital setting and second commonest infections accounting for nearly 25% of all infections seen in general population (nishatzehra). The pattern of antimicrobial susceptibility and resistance is different in different region. The current study highlights the relationship between gender, isolated bacterial agents and antibiotic susceptibility for empirical use of antibiotic in uncomplicated urinary tract infections and their outcome after use of susceptible antibiotic against isolated bacteria. The study was

confined to adult patients who have typical symptoms of UTI's. Epidemiologically urinary tract infections account for seven million office visits and one million emergency department visits, resulting in 100,000 hospitalizations yearly, making them the most common bacterial infections in outpatient and emergency department setting. Financially, the estimated annual cost of UTI is significant, at approximately \$1.6 billion.⁶

Studies show's that 50% women will have UTI at-least once in their life time while UTI in male are complex. Finding during this study were similar to other studies and general guidelines of infections of urinary tract.¹¹

In this study, majority of adults who have UTI, were females mainly due to the structural and anatomical difference like shorter urethra and microflora. The gender distribution in this study reported the statistically predominance of females {71% of positive culture}. Previous studies shows that approximately 1 in 3 women will require antimicrobial treatment for UTI before age 24, and 40% to 50% of women will have UTI during their life time. This result is more or less similar to those reported from different studies.⁷

The study conducted in 2014 in Lahore; Pakistan shows the prevalence of UTI with the highest prevalence of E-coli (80%) followed by Staphylococcus aureus (9.4%), Proteus species (5.4%) and Pseudomonas species (5.2%).¹⁴

The predominant uropathogen found in this study was Ecoli, and this finding is concordance with other studies, however different results have been reported. The difference and similarity in distribution and type of microorganism may result from different host factors, environment conditions, health care practices, socioeconomic standards, hygiene practices and education programs in each region.⁸

The enterobacteriaceae family was the most common microorganism found in urinary tract infection and among that Ecoli was the most predominant uropathogen which is 59.8% account in present study, which is somehow similar to previous studies done in different part of the globe. The prevalence of gram-positive cocci was not high in this study. High level of bacterial resistance was seen with gentamycin,

fosfomycin and tetracycline, which has caused considerable attention and most of the patients are sensitive to cephalosporin, ciprofloxacin, amikacine and third generation cifixime and ceftriaxone from gram negative vacilla (80 - 85%). The outcome of patients after three days use of appropriate antibiotics is 35 – 40% which is considerably low cure rate in uncomplicated UTI and after days it was 80 – 85%. In the Pakistani community; the usage of antibiotics started from early ages due to which the cure rate is low in 3 days and high in 5 days. 5 day usage gives accurate or desired quantity of antibiotics to the body delivering effective results. The empirical use of antibiotics in uncomplicated UTI in our community should be around 5 days.^{9,10}

CONCLUSION

It is concluded that gram-negative bacilli (Enterobacteracca) were responsible for UTI. The most predominant uropathogen was Ecoli and most effective antimicrobial agents are cephalosporin, ciprofloxacin, amikaenaine and third generation cifixime and ceftriaxone. The desirable outcome achieved was attained after 5 days of treatment.

Acknowledgement: We would like to acknowledge faculty of Ziauddin Hospital, North Campus for helping us during the study, staff for helping in data collection and all others who have given their input. The study was self funded.

REFERENCES

- ¹ Stamm WE, Norrby SR. Urinary tract infections: disease panorama and challenges. *J Infect Dis.* 2001; 183: Suppl 1:S1-S4
- ² Hooton TM. Pathogenesis of urinary tract infections: an update. *J Antimicrob Chemother.* 2000; 46 Suppl 1: 1-7.
- ³ Stapleton AE. Urinary tract infections in healthy women. *Curr Treat Opt Infect Dis.* 2003;
- ⁴ Hummers-Pradier E, Denig P, Oke T, Lagerlov P, et al. GPs' treatment of uncomplicated urinary tract infections – a clinical judgment analysis in four European countries. *Fam Pract* 1999; 16(6): 605-607.
- ⁵ Colgan R, Keating K, Dougouih M. Survey of symptom burden in women with uncomplicated urinary tract infections. *Clin Drug Investig.* 2004; 24(1): 55-60.

⁶ Joseph TD. Urinary Tract Infections and Prostatitis. In Wells BG, Schwinhammer TL, Hamilton CW, editors. *Pharmacotherapy Handbook*. 7th ed. New York: McGraw-Hill; 2008; 493-503.

⁷ Griebing TL, Urinary Tract Infection in Women. *Urologic diseases in America*. J Urol 2003; 589-618.

⁸ Kahlmeter G; ECO.SENS. An international survey of the antimicrobial susceptibility of pathogens from uncomplicated urinary tract infections: the ECO.SENS Project. *J Antimicrob Chemother*. 2003; 51(1): 69-76

⁹ Gupta K, Hooton TM, Stamm WE. Increasing antimicrobial resistance and the management of uncomplicated community-acquired urinary tract infections. *Ann Intern Med*. 2001; 135(1): 41-50

¹⁰ Goettsch WG, Janknegt R, Herings RM. Increased treatment failure after 3-days courses of nitrofurantoin and trimethoprim for urinary tract infections in women: a population- based retrospective cohort study using the PHARMO database: *Br J Clin Pharmacol* 2004; 58(2): 184-189

¹¹ Schaeffer AJ, Schaeffer EM. Infections of the Urinary Tract. In Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters C, editors. *Campbell-Walsh Urology*. 10th ed. USA: Elsevier Inc 2010; 257-270.

¹² Amin M, Mehdinejad M, Pourdangchi Z. Study of bacteria isolated from urinary tract infections and determination of their susceptibility to antibiotics; *Jundishapur J Microbiol* 2009; 2(3): 118-123

¹³ Ramanath KV, Shafiya SB: Prescription pattern of antibiotic usage for urinary tract infection treated in arural tertiary care hospital; *Indian J Pharm Prac* 2011; 4(2): 57-63.

¹⁴ Sabir S, Anjum AA, Ijaz T, Ali MA, Khan MR, Nawaz M. Isolation and antibiotic susceptibility of *E. coli* from urinary tract infections in a tertiary care hospital. *Pak J Med Sci* 2014; 30(2):389-392.