

Original Article

Antibiotic sensitivity and resistance patterns in community acquired urinary tract infections in a tertiary care hospital in Pondicherry

Dr. Rameshprabu S¹, Dr. Rameshkannan S², Mrs. Priyanka G³

¹Post graduate, Department of Pharmacology, SMVMCH, Puducherry

²Post graduate, Department of Pharmacology, SMVMCH, Puducherry

³Assistant professor, Department of Physiology, Ragas Dental College, Chennai

Name of the Institute/college: Sri Manakula Vinayagar Medical college and Hospital , Madhagadipet, Kalitheerthalkuppam, Puducherry (U.T.)- 605107

Corresponding author: Dr. Rameshprabu S

Abstract:

Introduction: Urinary tract infection [UTI] is the most common human bacterial infection in the community as well as in hospital settings. Increase in resistance among the urinary pathogens to commonly used antimicrobial agents is gaining the attention worldwide in respect to its treatment. Accurate bacteriologic records of culture results may provide guidance for empirical as well as specific therapy. The present study was undertaken to assess the commonest bacteriological profile in urine culture specimens and their antibiotic sensitivity, resistance pattern in our hospital.

Materials and methods: The retrospective study was done and culture and sensitivity reports were collected from SMVMCH Microbiology department, for a period of three months from May to July, 2013 were analysed.

Results: The study included 92 (81.4%) females and 21 (18.6%) males including children. Out of 423 reports only 27% were culture positive. The culture results indicated E.coli was the most common species (54.0%) followed by Klebsiella (18.6%) and Coagulase Negative Staphylococci (9.7%). High percentage of isolates were sensitive to Imipenem (100%), Amikacin (87%), Nitrofurantoin (78%) and Ceftazidime (76%). High percentage of resistance was seen with Amoxicillin-clavulanic acid (75%), Nalidixic acid (57%), Ciprofloxacin (51%), and Norfloxacin (47%). The antibiotics resistant against E.coli are Nalidixic acid (74%), Amox-clav (74%), Ciprofloxacin (62%), and Sensitive to E.coli are Imipenem (100%), Amikacin (93%), and Nitrofurantoin (92%).

Conclusion: Our study recommends usage of Nitrofurantoin as oral empirical treatment for UTI. Imipenem, Amikacin and Cephalosporins if used parenterally can produce better results in patients with UTI.

Key words: UTI, Antibiotic Sensitivity, Antibiotic Resistance, Urine culture

Introduction:

UTI remains second most common infectious disease and approximately about 150 million people were diagnosed with UTI each year.^[1] Its prevalence varies according to age, gender, seasons and living region.^[2] It is also one of the common infection that complicates pregnancy.^[3,4] UTI can be caused by different microorganisms including

bacteria, protozoa, parasites, fungi and viruses are the major causative organisms. Among these bacteria account for more than 95% of UTI cases.^[5] In under-developed and developing countries, inappropriate usage of antibiotics has led to increasing antibiotic resistance and the treatment of UTI is becoming far more difficult. The emerging resistance is noticed against commonly used drugs

such as Norfloxacin, Ciprofloxacin, Ofloxacin, Cotrimoxazole, and Cephalexin.^[6] Clinicians should be knowledgeable about their regional antibiotic resistance and sensitivity patterns for determining the empirical therapy till they get the culture results or even if they have no culture reports facilities.^[7] The present study was undertaken to assess the existing bacteriological profile in urine culture specimens and their antibiotic sensitivity, resistance pattern in our hospital.

Materials and methods:

This was a retrospective study conducted at Department of Pharmacology, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry. The data of all cases with urine culture positive reports were analysed from May 2013 to July 2013. Records were retrieved from the Microbiology department of our college. Bio medical data including Age, Sex, reports of urine microscopy and culture sensitivity were analysed. All the significant isolates were identified and studied by standard procedures and their antibiotic

susceptibility pattern was tested and interpreted according to Clinical and Laboratory Standards Institute (CLSI) recommendations. With the automatic identification system against to amikacin, amoxicillin/clavulanate, ampicillin, ampicillin/sulbactam, aztreonam, cefazolin, cefepime, cefotaxime, ceftaxitin, ceftazidime, ceftriaxone, cefuroxime sodium, ciprofloxacin, gentamicin, imipenem, levofloxacin, meropenem, nitrofurantoin, norfloxacin, piperacillin, piperacillin/tazobactam, tetracycline, tobramycin, trimethoprim/sulfamethoxazole. The data were entered and analysed using SPSS software version 21.0 and results were expressed in percentages.

Observations & results:

A total of 113 Urine culture sensitivity reports were analysed in the present study between May and July 2013. In our study the age and gender predominance was recorded. Among the study population UTI was commonly observed in the age group of 11-60 in female patients, where as in male the affected age group was 1-10 years and more than 61 years as shown in Table.1

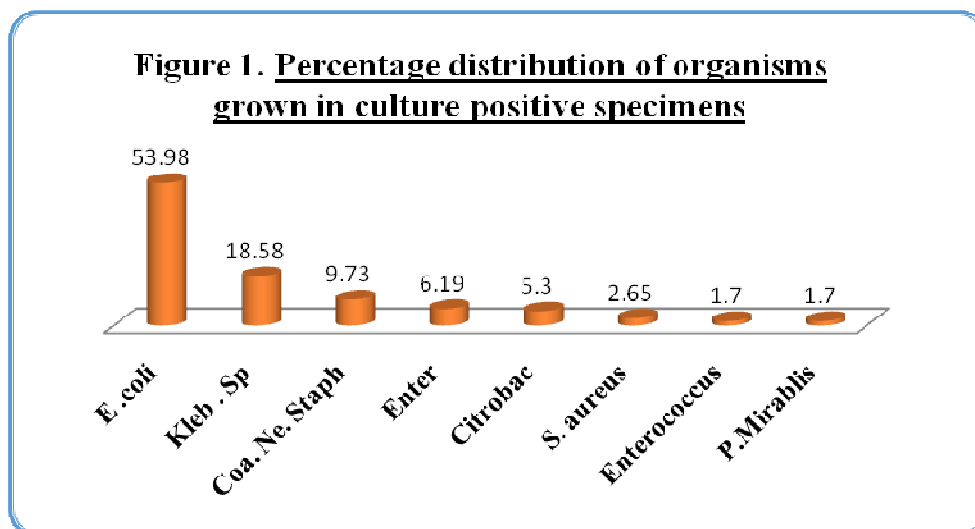
Table No: 1 Age and gender distribution in UTI.

Age in Years	1 to 10	11 to 60	>61 years
Male	57.10%	9%	45.40%
Female	42.90%	91%	54.60%

Distribution of Organisms grown in urine culture positive specimens:

E.coli (54%) was the most commonly isolated organism responsible for UTI in our study and the remaining included Klebsiella (18.6%), Coagulase

negative staphylococci (9.7%) and also other organisms like Enterobacteriaceae&citrobacter as shown in the Figure1.



Gender distribution of common Isolates in Percentage

Among the urine culture samples obtained, the common organisms encountered in male and female including children distribution is shown in Table No:2

Table No: 2 Gender distribution of common Isolates in Percentage

GENDER	E.coli	Kleb. Sp.
Female	82%	81%
Male	18%	19%

Sensitivity and resistance pattern of E. coli isolates to different antibiotics

The sensitivity and resistance pattern of the most common organism causing UTI is shown in table 3. The maximum sensitivity pattern was observed with Imipenem (100%), Amikacin

(93%), Nitrofurantoin (92%) followed by Ceftazidime (73%), Norfloxacin (44%) and Ciprofloxacin (38%). But, increasing resistance pattern to most commonly used drugs are seen with Nalidixic acid (74%), Amoxicillin + Clavulanic acid (74%) and Ciprofloxacin (62%).

Table No: 3 Sensitivity and resistance pattern of commonest isolate (E. coli) to frequently screened antibiotics

ANTIBIOTICS SENSITIVE to commonest organism (E–Coli)	Screened 50% and Above	RESISTANCE	SENSITIVE
Imipenem	98%	0%	100%
Amikacin	95%	7%	93%
Gentamicin	90%	35%	65%
Ciprofloxacin	85%	62%	38%
Norfloxacin	79%	56%	44%
Amox-Clav	77%	74%	26%
Ceftazidime	66%	28%	73%
Nalidixic acid	64%	74%	26%
Nitrofurantoin	62%	8%	92%

Discussion:

UTI continue to be a common clinical problem which contributes to morbidity as evidenced by their frequent hospital visits, hospitalization and also cause high economic cost. UTIs may demonstrate different epidemiological and etiological features due to gender, age and religion. So, the regional studies, from different times are of great importance for better understanding of the disease, effective treatment and prevention of complications.^[8] In our study UTI was most commonly observed with women than in men. The affected group in men is mostly seen below 10 years and above 60 years of age which could be correlated with prostate enlargement and other related problems of old age. The preponderance of female patients towards UTI than male, especially in their reproductive age group is due to anatomical structure of urogenital tract, menstrual cycle and pregnancy.^[9]

Among the culture reports obtained the most common organism being E.Coli (54%) which goes

in par with the previous reports obtained from various parts of the country^[10,11] But, the sensitivity and resistance pattern differs between areas. In our study, the Imipenem, Amikacin, Nitrofurantoin showed a very high sensitivity to E.Coli and this sensitivity pattern is similar to other studies.^[7,11] Nitrofurantoin sensitivity is not changed when compared to the previous study which implies that it can be used as empirical treatment for E.Coli infection in emergency conditions. Among the fluoroquinolones tested with Nalidixic acid and Ciprofloxacin showed high resistance rates. This alarming increase in resistance noticed with fluoroquinolones is similar to previous study.^[11] In addition among the penicillin group tested Amoxicillin/Clavulanic acid combination also showed significant resistance pattern. From our study the most frequently isolated organisms showed resistant to commonly used antibiotics like Nalidixic acid, Ciprofloxacin, Norfloxacin and Amoxicillin/Clavulanic acid. Antimicrobial resistance patterns will continue to

change, frequent and detailed studies should be performed for selecting appropriate antibiotics.

Conclusion:

The above study expound that there is an increasing need for selection of appropriate and effective antibiotics, as the antibiotic resistance patterns are increasing against microorganisms causing community acquired UTI. Appropriate use of empirical antibiotics based on the bacterial

susceptibility of that particular area is of utmost importance. In our study E.coli showed to be the most predominant uropathogen. The most useful antibiotic found to be Nitrofurantoin which can be given orally highlighting the main advantage in outdoor patients. In addition Imipenam, Amikacin and Cephalosporins can be considered for indoor patients for the empirical treatment of UTI.

References:

1. Karlowsky JA, Kelly LJ, Thornsberry C, Jones ME, Sahm D. Trends in antimicrobial resistance among urinary tract infection isolates of Escherichia coli from female outpatients in the United States. *Antimicrob Agents Chemother* 2002;46:2540-5.
2. Stranieri G, Zampogna S, Ielapi V, Defilippo Rg, Defilippo V, Cristofaro G, Galiano R, Capillo S, Madonna L, Cifalà S, Ferro V, Rubino R. Cefixime for the prophylaxis of UTIs in children with malformativeuropathies: An open study. *Eur Rev Med PharmacolSci* 2003; 7: 57-64.
3. Addo VN. UTI in pregnancy. In: Kwawukume EY, Emuveyan EE, editors. *Comprehensive Obstetrics in the Tropics*. Dansoman: Asante and Hittscher Printing Press Limited; 2002; 261–267.
4. Cunningham FG, Gant NF, Leveno KJ, Gilstrap LC III, Hauth JC, Wenstrom KD. Renal and Urinary Tract Disorders. In: Andrea Seils, Noujaim SR, Daris K, editors. *Williams Obstetrics*. 21st ed. New York: McGraw-Hill Medical Publishing Division. 2001;1251–1272.
5. Arjunan M, Al-Salamah AA, Amuthan M. Prevalence and antibiotic susceptibility of uropathogens in patients from a rural environment, Tamil Nadu. *Am J Infect Dis*. 2010;6:29–3.
6. KasiMurugan, Savitha T, and Vasanthi.S. Retrospective study of antibiotic resistance among uropathogens from rural teaching hospital, Tamilnadu, India. *Asian Pac J Trop Dis* 2012; 2(5): 375-380
7. Smita Sood, Ravi Gupta. Antibiotic resistance pattern of community acquired uropathogens at a tertiary care hospital in Jaipur, Rajasthan. *Indian Journal of Community Medicine*. 2012; Vol 37(1) P. 39-44.
8. Yolbas I, Tekin R, Kelekci S, Tekin A, Okur MH, Ece A et al. Community acquired UTIs in children: pathogens, antibiotic susceptibility and seasonal changes. *Eur Rev Med Pharmacol Sci*. 2013; Apr;17(7):971-6.
9. Mittal S, Sharma M, Chaudhary U. Study of virulence factors of uropathogenic Escherichia coli and its antibiotic susceptibility pattern. *Indian J PatholMicrobiol* 2014 [cited 2014 Aug 5];57:61-4.
10. Manikandan S, Ganesapandian S, Manoj Singh and Kumaraguru A.K. Antimicrobial Susceptibility Pattern of Urinary Tract Infection Causing Human Pathogenic Bacteria. *Asian Journal of Medical Sciences*. 2011; 3(2): 56-60,
11. Mangaiarkkarasi A, Meher Ali R and Gopal R. Study of Antimicrobial Susceptibility Pattern of Escherichia coli Isolated from clinical specimens in a Teaching Hospital, Pondicherry. *RJPBCS*. 2013; Vol 4 (1) P.1365-1371.

