

Study Of Bacteriological And Antimicrobial Susceptibility Pattern Of Uropathogens

Dr Roshni Patel*, Dr Falguni Chavada**

*Assistant Professor, Microbiology Department, **Medicine Department, GMERS Medical College, Himmatnagar, Gujarat, India.

Abstract: Background & Objective: Urinary tract infection is one of the common infections in the Indian community. Distribution and susceptibility of UTI-causing pathogens change according to time and place. This study aims to analysis present trend of locally prevalent uropathogens and their antibiotic susceptibility for prudent use of antibiotics to combat antimicrobial resistance. **Methodology:** Total 135 urine samples from suspected UTI was collected from both outdoor and indoor patients during the study period of August 2014 to Jun 2015. Culture and antibiotic sensitivity testing of the isolates were done. At the last, analysis of uropathogen and antibiotic susceptibility pattern was done. **Results:** Total 54(40%) samples were found to be positive for uropathogen in culture, in which gram negative organisms & gram positive organisms were isolated from 45 (83%) & 9(17%) samples, respectively. The E coli was most common organism isolated. **Conclusion:** Females are predominantly affected by UTI, with most common uropathogen E coli. Antimicrobial susceptibility pattern shows high sensitivity for Amikacin and levofloxacin compared to other routinely used antibiotics. [Patel R NJIRM 2016; 7(1):47-49]

Key Words: Antimicrobial susceptibility pattern, Bacteriological pattern, Urinary tract infection.

Author for correspondence: Dr Roshni Patel, Department of Microbiology, GMERS Medical college, Himmatnagar, Gujarat, India. **Email:** drroshnipatel@gmail.com

Introduction: Urinary tract infection is one of the most common bacterial infections encountered by clinicians in developing countries¹ & urine samples constitute the largest single category of specimens examined in most medical microbiological laboratories². Catheter acquired urinary tract infection is one of the most common health care acquired infections^{3,4}.

The prevalence of antimicrobial resistance continues to increase in the globally^{5,6}. Particularly troublesome is the increasing resistance to broad-spectrum antibiotics such as fluoroquinolones and cephalosporins due to an overconsumption of these two groups and the parallel development of co-resistance to other antibiotics (collateral damage)⁷. The treatment becomes more challenging in the presence of risk factors such as higher age, comorbidity, and immunosuppression. Many times, physicians resort to prescribing broad-spectrum antibiotics over specific antibiotics in the view of resistance of the causative organism to the antibiotic. Poor patient compliance and incomplete course of antibiotic therapy have resulted in the evolution of resistance to many of these antibiotics.

Various studies done worldwide have shown changing patterns in the etiology of UTIs^{8,9}. Bacterial resistance development is a threat for treatment of UTI. There is a direct correlation between the use of antibiotics and resistance development. There is an urgent need for combating resistance development by a prudent use of available antibiotics¹⁰, for that knowledge of locally prevalent uropathogen and its antibiotic resistance pattern is essential to treat the patient with empiric antibiotic therapy.

The study aims to analysis present trends of locally prevalent uropathogens and their antibiotic susceptibility, which is essential to guide clinician for the empirical treatment of UTIs while awaiting the culture sensitivity to avoid misuse or overuse of antibiotic for combating resistant development.

Material and Methods: The study was done from August 2014 to Jun 2015. The urine samples from suspected UTI cases were collected from both outdoor and indoor patients. The samples were cultured and the growth were recorded after incubation period of 24 - 48 hours growth. Identification of bacterial isolates was done on the basis of cultural and biochemical characteristics. Antibiotic sensitivity testing was done by Kirby Bauer's disk diffusion method on Muller Hinton agar. The permission was taken from Institutional Review Board for the study.

Results: Total 135 urine samples were collected in study period, in which 50(37%) and 85(63%) samples were collected from male and female, respectively. Out of 135 samples, total 54(40%) samples were found to be positive for uropathogen in culture.

Out of 54 positive urine samples for uropathogen, 17(31.5%) and 37(68.5%) samples were from male and female patients, respectively.

The gram negative organisms were isolated from 45 (83%) samples and gram positive organisms were isolated from 9(17%) samples.

Table 1 : Frequency of isolation of uropathogens

Organism	Frequency of isolation (No.)	Type of organism	Frequency of isolation (%)
Escherichia coli	28	Total	51.8%
Klebsiella sp.	5	Gram negative bacteria isolated-45	9.3%
Proteus sp.	5		9.3%
Other Gram negative bacteria	4		7.4%
Pseudomonas sp.	3		5.5%
Enterococcus sp.	4	Total	7.4%
Staphylococcus aureus	3	Gram Positive bacteria isolated-9	5.5%
Staphylococcus ,coagulase negative	2		3.7%

Table 2: Antibiotic susceptibility pattern of E. coli

Antimicrobial agent	Escherichia coli
Ampicillin	16.7%
Ampicillin/sulbactam	66.7%
Cefixime	22.2%
Cefepime	33.3%
Gentamicin	57.1%
Amikacin	76.5%
Levofloxacin	75%
Norfloxacin	35%
Trimethoprim/sufamethoxazole	42%
Nitrofurantoin	67%

Discussion: In the present study ,urine culture positivity rate is 40%.The urine culture positivity rate varies in different studies from 38% to 54%(38%,42% and 54% in study done by Ritu Aggarawal et al.¹¹ , Nirajkumas Biswas et al.¹² , Devanand Prakash et al. ¹³ respectively). Suspected UTI cases shows preponderance of female cases and about two third of positive culture samples for uropathogens were collected from female patients. This was in agreement with other studies by Bashir MF et al¹⁶,Getenet B.et al¹⁷ , N. Suneetha et al¹⁴.Women are more prone to UTI than men because in females , the urethra is much shorter and closer to the anus¹⁵.

The most common uropathogen in our study is E coli(51.8%).Most of the studies shows E coli as a most common causative organism and isolation percentage varies from 39 to 67% (12-15)(39% ,41%,43%,67% in study done by N Suneetha et al. ¹⁴,Nirajkumar Biswas et al. ¹²,Devanand Prakash et al. ¹³ , M. Eshwarappa et al.¹⁵

The second most common uropathogen is klebsiella(9.3%) and proteus (9.3%).Most of the study shows klebsiella as a second most common organism ,but its percentage varies from 16% to 30%.(16% ,19%,20%,30% in study done by M. Eshwarappa et al.¹⁵ , Devanand Prakash et al.¹³ , Nirajkumas Biswas et al.¹² , N. Suneetha et al.¹⁴

Higher incidence of gram negative bacteria, related to Enterobacteriaceae, in causing UTI has many factors which are responsible for their attachment to the uroepithelium. In addition, they are able to colonize in the urogenital mucosa with adhesins, pili, fimbriae, and P-1 blood group phenotype receptor¹⁹.

As E coli is the most commonly isolated organism with frequency of 51.8% and other different organisms has very low frequency of isolation compared to E coli ranging from 3 to 10%,antimicrobial resistant pattern of E coli can closely reflect the antimicrobial resistant pattern of uropathogens. Same is true for all most all the studies, as E coli is most isolating organism in most of the studies. We here compare the antimicrobial susceptibility pattern of E coli in our study to other studies in India. After studying antibiotic susceptibility pattern in different studies ,it seems that it is very different in different area. Thus, study of antibiotic susceptibility pattern of locally prevent uropathogen is necessary.

Table 3:Comparison of Antibiotic sensitivity(%)of E coli

Name of antibiotic	Our study	N Suneetha et al. ¹⁴	Devanand Prakash et al. ¹³	Nirajkumas Biswas et al. ¹²	BL Chau dhary et al. ¹⁸
Ampicillin/sulbactam	67%	-----	-----	-----	50%
Cefepime	33%	-----	-----	38%	-----
Gentamicin	57%	32%	-----	-----	-----
Amikacin	76%	59%	91%	100%	40%
Levofloxacin	75%	-----	66.7%	62%	70%
Norfloxacin	35%	54%	-----	-----	78%
Trimethoprim/sufamethoxazole	42%	27%	15%	35%	-----
Nitrofurantoin	67%	-----	74%	86%	80%

Conclusion: Female are predominantly affected by urinary tract infection with E coli as the most common

uropathogen. The antimicrobial susceptibility of uropathogen differ widely in different locality. This study provides valuable data of antimicrobial resistance pattern in local area to guide empirical treatment of urinary tract infection, so it is also important for prudent use of antibiotic and decrease antimicrobial resistance.

References:

- Ronald AR, Nicolle AE, Stamm E, et al. Urinary tract infection in Adults: Research priorities and strategies. *Int J Antimicrob Agents*. 2001;17:343-348.
- Morgan MG, McKenzie H. Controversies in the laboratory diagnosis of community-acquired urinary tract infection. *Eur J Clin Microbiol Infect Dis*. 1993; 12:491-504.
- Zarb P, Coignard B, Giskevicienne J et al. The European Centre for Disease Prevention and Control (ECDC) pilot point prevalence survey of healthcare-associated infections and antimicrobial use. *Euro Surveill* 2012, 17(46):pil=20316.
- Magill SS, Edwards JR, Bamberg W et al. Multistate point-prevalence survey of health care-associated infections. *N Engl J Med* 2014, 370:1198-1208.
- Gupta K, Scholes D, Stamm WE. Increasing prevalence of antimicrobial resistance among uropathogens causing acute uncomplicated cystitis in women. *J Am Med Assoc*. 1999;281:736-738.
- Gupta K, Sahm DF, Mayfield D, Stamm WE. Antimicrobial resistance among uropathogens that cause community-acquired urinary tract infections in women: a nationwide analysis. *Clin Infect Dis*. 2001;33:89-94.
- Cassier P, Lallechère S, Aho S, et al. Cephalosporin and fluoroquinolone combination are highly associated with CTX-M β -lactamase-producing *Escherichia coli*: a case control study in a French teaching hospital. *Clin Microbiol Infect* 2011;17(11):1746-51.
- Manges AR, Natarajan P, Solberg OD, et al. The changing prevalence of drug-resistant *Escherichia coli* clonal groups in a community: evidence for community outbreaks of urinary tract infections. *Epidemiol Infect*. 2006;134:425-31.
- Kahan NR, Chinitz DP, Waitman DA, et al. Empiric treatment of uncomplicated urinary tract infection with fluoroquinolones in older women in Israel: another lost treatment option? *Ann Pharmacother*. 2006;40:2223-7.
- M. Grabe, R Bartoletti et al. Bacterial resistance developments. Guidelines on urological infections. 2014: 8
- Ritu Aggarawal, Maneesh Goyal et al. Bacterial isolates and their antibiotic susceptibility profile recovered from urine samples in NCR, Ghaziabad (U.P.) *JEMDS* 2014;3(28):7831-7836.
- Nirajkumar Biswas, Parimal H Patel et al. Bacteriological profile of urinary tract infection and its antibiotic susceptibility at tertiary care hospital, Valsad, Gujarat, India. *J Pharm Biomed Sci*. 2014;04(09):751-754.
- Devanand Prakash, Ramchandra Sahai Saxena. Distribution and Antimicrobial Susceptibility Pattern of Bacterial Pathogens Causing Urinary Tract Infection in Urban Community of Meerut City, India. *ISRN Microbiology*. Volume 2013
- N. Suneetha*, P. Subbulu, S. Usha Vidya Rani, et al. Bacteriological Study of Urinary Tract Infection. *IJIMS*, 2015, 2(4), 11-16.
- M. Eshwarappa, R. Dosegowda, I. Vrithmani Aprameya, et al. Clinico-microbiological profile of urinary tract infection in south India. *Indian J Nephrol*. 2011 Jan-Mar; 21(1): 30-36.
- Bashir MF, Qazi JI, Ahmad N Riaz S. Diversity of urinary tract pathogens and drug resistant isolates of *Escherichia coli* in different age and gender groups of Pakistanis. *Tropical Journal of Pharmaceutical Research*, September 2008; 7(3): 1025-1031
- Getenet B, Wondewosen T. Bacterial uropathogens in Urinary tract infections and Antibiotic susceptibility pattern in JIMMA university specialized hospital, Southwest Ethiopia. *Ethiop J Health sci*. vol .21, No.2 JULY 2001 (2):141-456.
- BL Chaudhary, Charu Chandra & Snehanu Shukla. Bacteriology of urinary tract infection & antibiotic susceptibility pattern among diabetic patients. *International journal of Bioassay*. 2014, 3(08), 3224-3227.
- R. N. Das, T. S. Chandrashekar, H. S. Joshi, Frequency and susceptibility profile of pathogens causing urinary tract infections at a tertiary care hospital in western Nepal. *Singapore Medical Journal*, 2006; 47(4): 281-285

Conflict of interest: None

Funding: None

Cite this Article as: Patel R, Chavada F. Study Of Bacteriological And Antimicrobial Susceptibility Pattern Of Uropathogens. *Natl J Integr Res Med* 2016; 7(1):47-49