

Antimicrobial Susceptibility Pattern of Bacterial Isolates from Urine Specimen of Patient with Complain of Urinary Tract Infection at A Tertiary Care Teaching Hospital in Solapur, Maharashtra.

Dr Anu Sharma¹, Dr Sonal Agarwal², Dr D.P. Danave³, Dr K.V.Ingole.

¹Assistant Professor Microbiology, Dr VMGMC Solapur

²Post Graduate Student Microbiology, Dr VMGMC Solapur

³Assistant Professor Microbiology, Dr VMGMC, Solapur

⁴Professor and Head of department Microbiology, Dr VMGMC, Solapur.

DOI: 10.29322/IJSRP.9.01.2019.p8573

<http://dx.doi.org/10.29322/IJSRP.9.01.2019.p8573>

Abstract- Background: Urinary tract infections (UTIs) account to one of the major reasons for hospital visits by patients, it remains to be one of the commonest infectious diseases diagnosed in developing countries, emergence of antibiotic resistance in uropathogens due to misuse or overuse of antibiotics and has led to limited therapeutic options for treatment which is serious concern for clinicians. **Material and method:** Clean catch mid-stream urine from each patient was collected instructions were given to the patient about method of urine collection, specimen was labelled and transported to the laboratory and analysed within 2 hours of collection. Sample was subjected to wet mount and gram stain for pus cells & evaluation of any bacteria in sample for provisional report and cultured on blood agar and MacConkey medium. Only patients with clinical symptoms of UTI and positive urine culture were included in the study. Study was conducted for a period of 3 months from September- November 2018. **Results:** A total 656 samples were received in Microbiology department from patients suspected of UTI, out of which growth was seen in 164(25%) so the urine culture positivity rate is 25%, sterile samples were 363 (55.33 %) *Candida* species were seen in 36 (5.48%) samples, insignificant bacteraemia was seen in 57(8.63%) samples, polymicrobial flora was seen in 36 (5.48%) samples. Females 87(53.04%) were more commonly affected by UTI as compared to males 77 (46.95%), in females most common age group affected was from 15-30 years (50.57%) followed by 31-45 years (17-24) however in case of, males most common age group was from 1-4 years (28.57%) followed by age group > 60 years (23.4%). Most common uropathogens isolated from suspected cases of UTI were gram negative bacteria 141 (85.97%) out of which most common was *E-coli* 45 (27 %) followed by *Klebsiella pneumoniae* 41 (25%), *Citrobacter Koseri* 24 (14.6%), *Enterobacter aerogens* 17 (10.36%), *Pseudomonas aeruginosa* 10 (6.09%), *Acinetobacter baumannii* 4 (2.4%). Among gram positive bacteria *Staphylococcus species* were 15(9.01%) out of which MRSA were 5 (33.33%) *Staphylococcus saprophyticus* 9 (60%) and *Staphylococcus epidermidis* 01(6.66%) isolate was seen. *Streptococcus pyogens* 8 (34.78%). Antibiotic susceptibility in gram negative bacteria showed high resistance among urinary isolates was seen with sensitivity to Imipenem (37.2%) followed

by Amikacin 37 %, Cefotaxime 36%, Norfloxacin 36 %, Nitrofurantoin 31.70%, Among gram positive bacteria 100% sensitivity was seen for Vancomycin and Linezolid.

Index Terms- UTI- urinary tract infection, culture positivity rate.

I. INTRODUCTION

Urinary tract infection (UTI) is commonest bacterial infectious disease encountered in clinical practice which has led to increase in morbidity and financial burden on patient. It has been estimated that 150 million people are infected with UTI per annum worldwide¹.

UTI can be classified into uncomplicated and complicated on the basis of their choice of treatment². UTI is more common in females as compared to males due to anatomical factors like short urethra, proximity of the genital tract & urethra³. Other physiological factors may include pregnancy where the plasma volume increases and decrease in urine concentration occurs which may lead to bacterial growth in urine⁴. Sexual activity in females also increase risk of urethral contamination during coitus^{5,6}.

UTI is most commonly caused by bacteria but may also occur due to fungal and viral infection. Gram negative bacteria causes up to 90% of UTI cases while gram positive bacteria cause only 10 % of cases. Most common uropathogens encountered includes *E .coli* which accounts to 60-90 % of all UTIs^{7,8}.

Emergence of antibiotic resistance especially MRDO has made treatment of UTI difficult, which is a serious public health issue. The present study is conducted with aim to know the bacteriological profile and antibiotic sensitivity pattern to commonly use antibiotic agent among patients with complaints of UTI at a tertiary care teaching hospital in Solapur, Maharashtra.

II. MATERIAL AND METHOD⁹

Clean catch mid-stream urine from each patient was collected in 20 ml sterile screw cap container instructions were

given to the patient about method of urine collection, specimen was labelled and transported to the laboratory and analysed within 2 hours of collection. Sample was subjected to wet mount and gram stain for pus cells & evaluation of any bacteria in sample for provisional report and cultured on blood agar and MacConkey medium. Antibiotic susceptibility testing was done by Kirby Bauer disc diffusion method as per CLSI guidelines¹⁰. Only patients with clinical symptoms of UTI and positive urine culture were included in the study while urine samples with 3 or more types of colonies were reported as poly-microbial flora and advised to send repeat sample. In case of insignificant bacteria was reported only after ruling out various conditions where low count is also considered to be significant. Extended beta lactamases (ESBL) detection was done using combined disc test, Metallo-beta- lactamases (MBL) detection was done on isolates resistant to Imipenem using Modified Hodge test, Amp-C production was detected using Amp-C disc test as per CLSI guidelines¹⁰. Study was conducted for a period of 3 months from September- November 2018 in Microbiology department at tertiary care hospital in Solapur, Maharashtra.

III. RESULTS

A total 656 samples were received in Microbiology department from patients suspected of UTI during September to August 2018. Out of which growth was seen in 164(25%) so the urine culture positively rate is 25%, sterile samples were 363 (55.33 %) Candida species were seen in 36 (5.48%) samples, insignificant bacteria was seen in 57(8.63%) samples (after ruling out various conditions where low count is also considered significant), poly-microbial flora was seen in 36 (5.48%) samples. Females 87(53.04%) were more commonly affected by UTI as compared to males 77 (46.95%), in females most common age group affected was from 15-30 years (50.57%) followed by 31-45 years (17-24) however in case of, males most common age group was from 1-4 years (28.57%) followed by age group > 60 years (23.4%). Most common uropathogens isolated from suspected cases of UTI were gram negative bacteria 141 (85.97%) out of which most common was *E-coli* 45 (27 %) followed by *Klebsiella pneumoniae* 41 (25%), *Citrobacter Koseri* 24 (14.6%), *Enterobacter aerogens* 17 (10.36%), *Pseudomonas aeruginosa* 10 (6.09%), *Acinetobacter baumannii* 4 (2.4%). Among gram positive bacteria *Staphylococcus species* were 15(9.01%) out of which MRSA were 5 (33.33%) *Staphylococcus saprophyticus* 9 (60%) and *Staphylococcus epidermidis* 01(6.66%) isolate was seen. *Streptococcus pyogens* 8(34.78%). Antibiotic susceptibility in gram negative bacteria showed high resistance among urinary isolates with sensitivity to Imipenem (37.2%) followed by Amikacin 37 %, Cefotaxime 36%, Norfloxacin 36 %, Nitrofurantoin 31.70%, in case of *Pseudomonas aeruginosa* high sensitivity was seen for ceftazadime 80 % and Piperacillin-tazobactam was 70 %. Among gram positive bacteria 100% sensitivity was seen for Vancomycin and Linezolid, while sensitivity to other antimicrobials were as follows Clindamycin 73%, Erythromycin 40 %, Gentamicin 13.6 %, Norfloxacin 40.4 %. Nitrofurantoin 53.3 %, Penicillin and Nitrofurantoin showed 50 % sensitivity. In case of *Streptococcus pyogens* sensitivity for tetracycline and Norfloxacin 37.5% was seen respectively.

IV. DISCUSSION

In present study prevalence of UTI was found to be about 25%. Studies done by Devanand Prakash et al¹¹ reported prevalence of UTI 53.82 % among patients. Studies done by Wabalem Desta Seifu et al¹² reported overall prevalence of UTI in the area was 90.1%, in our study the prevalence of UTI is found to be less which may be attributed to the fact that it is institution based study so variation may exist, also socioeconomic status & other demographical factors may vary and may lead to variation in prevalence rate of UTI.

In the present study females (n=87)53.04% were more commonly affected by UTI as compared to males 46.95 %, similar results have been reported by Devanand Prakash et al¹⁰ and wabalem Desta Seifu et al¹¹. this is attributed to anatomical differences of urogenital organs between two sexes and sexual activity may lead to urethral contamination during sexual intercourse which often results into UTI.

In the present study age group in females most commonly affected is 15-30 years (50.57%) followed by 31-45 years (17.24%) this is due to the fact that females in the age group are sexually active and physiological activity like pregnancy may predispose patients to UTI. In the present study age group in males commonly affected is 1-14 years (29 %) followed by age group > 60 years (23.4%). Males have bimodal frequency for UTI, one peak in childhood and other peak in elderly patient. In elderly patients especially in male's risk of UTI increases due to genitourinary atrophy^{13,14}.

In early childhood prevalence of UTI in more often due to congenital malformations and uncircumcised genitalia which is often contaminated and may lead to increase prevalence of UTI in early childhood¹⁵.

In the present study most common uropathogens isolated were gram negative bacteria 141 (35.97%) followed by gram positive bacteria 23 (14.02%) studies done by S.B. Salek et al, A.S.Kolawale et al¹⁶, F Khorvash et al¹⁷ are in concordance with our findings. in our study among negative bacteria *E .coli* contributes to about 27% of UTI while *Staphylococcus spp* contributes to 15 % of UTI, these findings are in concordance to various studies done by Devanand Prakash et al¹⁰ & wabalem Desta seifu et al¹¹, where *E.coli* and *Staphylococcus* species are predominantly isolated among gram negative and gram positive bacteria respectively.

Overall antibiotic susceptibility pattern among gram negative uropathogens were found to be multi drug resistant organism (MDRO) with sensitivity to Imipemen (37.2%) followed by Amikacin (37%), Cefotaxime (36%), Norfloxacin (36%) and Nitrofurantoin 31.70%. Among *Pseudomonas aeruginosa* isolates high sensitivity was seen for ceftazadime (80%) followed by Pippercallin-tazobactam(70%).

Among gram positive bacteria 100 % sensitivity was seen for Vancomycin & linezolid followed by Clindmycin 73 %, Nitrofurantoin 53.3%, Norfloxacin 40.4%, Erythromycin 40 %, Gentamicin 13.6%. Among GAS (Group –A streptococcus) sensitivity was seen for tetracyclin and Norfloxacin 37.5 % respectively. Among gram negative bacteria 141 (85.97 %), 75 (53.2%) isolates were ESBL while 50 (35.5%) isolates were MBL producers. And 10(7.09%) isolates were Amp –C producers.

Klebsiella pneumoniae 35 (85.4%) isolates were ESBL producer, while among *E.coli* 30(66.66%) where MBL producers and

5(3.54%) isolates of *E.coli* were Amp-C producer. Amp-C producers were only seen among 3 (2.12%), *Citrobacter Koseri* and 2 (1.41%) isolates among *Klebsiella pneumonia*.

In the present study we see high level of resistance among gram negative bacteria with 53.2% of uropathogens were ESBL producers 35.5% of uropathogens were MBL producers and 7.09% of uropathogens were Amp-C producers among gram positive bacteria MRSA were 33.33 %.

Variation in antibiotic resistance may be between different countries, among different cities even between different institutions this may be attributed to the local antibiotic prescribing habits, patient group under study, socioeconomic status of the patients, hygiene practices and awareness among patients about drawbacks of using over the counter drugs or self-medication.

V. CONCLUSION

UTI is most common problem worldwide; emergence of resistant strains is an widespread phenomenon. There is need to keep vigilance on misuse/ overuse of antibiotics. There is need to increase awareness among patient on the adverse effects of misuse/overuse of drugs and also discourage them to procure over the counter drugs. Hospital should also revise antibiotic policy annually according to local trends of antibiotic sensitivity patterns there is also need to adhere to strict antibiotic stewardship policies. This study has highlighted the bacteriological profile and antibiotic susceptibility patterns among uropathogens from patients visiting tertiary care hospital in Solapur this study will help in guiding for formulation of antibiotic policy and to know local antibiotic sensitivity patterns among population.

REFERENCES

- [1] C.M. Gonzalez and A.J. Schaefer. Treatment of urinary tract infection: whats old, whats new and what works, world Journal of urology, volume 17, no 6, pp 372 to 382, 1999.
- [2] S.M. Sabra and M.M. Abdal Fattah. Epidemiological and microbiological profile of nosocomial infections in Taij hospitals, KSA (2010-2011). World Journal of Medical science, vol 7, no. 1, pp 1-9, 2012.
- [3] J.W. Warren, E.Abrutyn, J.Richard Hebel, J.R. Johnson , A.J. Schaefer and W.E. Stamm. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Clinical infectious diseases, vol 29, no-4, pp 745-758.1999.
- [4] M.J. Ebie, Y.T. Kandarki Elukemi, J. Ayanbadejo and K.B. Tanyigna.UTI infections in Nigerian Military hospital. Nigerian Journal of Microbiology vol 15, no 1, pp 31-37,2001.
- [5] M.J.Lucas and F.G. Cunningham, urinary infections in pregnancy, clinical obstetrics and gynaecology vol 36, no 4,pp- 855-868 1993.
- [6] A.S. Kolawole, O.M. Kolawale, Y.T. Kandaki Olukami, S.K. Babatunde, K.A.Durowade and C.F. Kolawade. Prevalence of urinary tract infections (UTI) among patients attending Dalhauu Araf specialist hospital Lafias, Nasarawa state, Nigeria. International Journal of Medical sciences, Vol no 1, no 5, pp 163-167,2009.
- [7] Haider G, Zehra N, Afroz Munir A. Risk factors of urinary tract infections in pregnancy, J. Pak Mud Association.2010;60.

- [8] Raz R Et al. Demographic characteristics of patients with community acquired bacteriuria and susceptibility of urinary pathogens to anti-microbial in northern Israel. Isr Med Association J.2002;2(6): 426*429.
- [9] Washington Winn, Jr., Allen Stephen, Janda William, Koneman Elmer, Procop Gary, Srechenberger Paul, Woods Gail "The non-fermentative Gram negative bacilli" Koneman'sColour atlas and textbook of diagnostic Microbiology, 6th edition, 2006, Lippincott William & Wilkins.
- [10] CLSI guidelines: Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Disks Susceptibility Tests; Approved Standard. 25th informational supplement CLSI document M100-S27. Wayne, PA: CLSI; 2017.
- [11] Devanand Prakash and Ramchandra Sahai Saxena distribution and anti-microbial susceptibility patterns of bacterial pathogens causing urinary tract infection in urban community of Meerut city, India. Hindauri Publishing corprotion ISRN Microbiological vol 2013, article ID 749629, 13 pages' http:// dx.doi.org/10.1155/2013/749629.
- [12] Wubalem Desta seifu and Alemayetu Desalegn Gebissa. Prevalance and antibiotic susceptibility of uropathogens from cases of urinary tract infections(UTI) in Shashemene referral hospital, Ethiopia. BMC infect Dis 2018; 18:30 doi 10.1186/s 12879- 017- 2911- X)
- [13] A Kothari and V. Sagar Antibiotic resistance in pathogen causing community acquired urinary tract infections in J.N.M.C hospital Aligarh, India. Annals of Clinical microbiological and Antimicrobials, vol 6 article 4,2007.
- [14] J.car, urinary tract infections in women: diagnostic and management in primary care. British Medical Journal, vol 332, no 7533, pp 94-97,2006.
- [15] Weekes LM Antibiotic resistance changing management of urinary tract infections in aged care. Med J Aust 2015; 203(9) :352 doi:10.5694/mjal 15.01005.
- [16] S.B. Salek, infections syndrome in Medical Microbiological, 4th edition 1992
- [17] A.S. Kolawale, O.M. Kolawale, Y.T. Kandaki Olukemi, S.K.Babatunde, K.A Durowade and C.F. Kolawale. Prevalance of urinary tract infections (UTI) among patients attending Dalhatu Araf specialist hospital, Lafia, Nasarawa state Nigeria, International journal of medical science, vol1, no5, pp 163-167.2009.
- [18] F. Khorvash, K.Mostafavizadeto, S.Mobasherizadeh and M.Behjati. A comparison of antibiotic susceptibility pattern of Klebsiella associated urinary tract infections in spinal cord. Injured patients with nosocomial infections Acta Medica Iranica, Vol 47, no 6, pp 47-450,2009.
- [19] K.Bono, J Khan, R.H. Begem et al., Pattern of antibiotic sensitivity of Bacterial pathogens among urinary tract infections (UTI) patients in Pakistani Population African Journal of Microbiological research, vol6 pp 414-420,2012.

AUTHORS

First Author – Dr Anu Sharma, Assistant Professor
Microbiology, Dr VMGMC Solapur

Second Author – Dr Sonal Agarwal, Post Graduate Student
Microbiology, Dr VMGMC Solapur

Third Author – Dr D.P. Danave, Assistant Professor
Microbiology, Dr VMGMC, Solapur

Fourth Author – Dr K.V.Ingole, Professor and Head of
department Microbiology, Dr VMGMC, Solapur.

Corresponding Author 1. Dr Anu Sharma Assistant Professor
Microbiology, Dr VMGMC Solapur.

Email: dranusharma2014@gmail.com,

Mobile:7721091299.