Antibiotic Resistance Among Uropathogens : A Challenge

Dr.Vaishali Rahangdale*, Dr.Swati Bhise*

* Assistant Professor,Department of Microbiology,Government Medical College, Nagpur ,Maharashtra state, India.

Abstract : Background objectives: Urinary tract infection (UTI) is among the most common infection described in outpatient setting & hospital patients. The increasing prevalence of antimicrobial resistance is a major health problem & is associated with high morbidity & mortality. So ,a retrospective study of one year was conducted to know the current scenario of antibiotic resistance among uropathogens in Central India. Material &Methods: Fresh midstream urine samples were aseptically collected in sterile containers. Each sample was plated on 5% sheep blood agar & MacConkey agar plates using a standard loop technique & the growth was processed by standard bacteriological technique. After biochemical identification, antimicrobial sensitivity testing was done for the isolates using Kirby-Bauer methods on Mueller-Hinton agar & results were interpreted as per the CLSI 2011 guidelines. Results: The commonest uropathogen obtained was E.coli (56.1%) followed by the klebsiellae species.(27.6%).Among gram- positive organism ,S.aureus (1.9%) was most prevalent uropathogen obtained. Among ,Gram positive organism ,the maximum resistance was observed towords Penicillin G followed by erythromycin.All enterococcal isolates showed maximum resistance to commonly used urinary antibiotic i.e norfloxacin & nitrofurantoin. All Gram-positive isolates were 100% sensitive to vancomycin & Teicoplanin These isolates showed resistance to all the commonly used antibiotics. The main challenge is the multidrug resistance (i.e resistance to more than 3 drugs) shown by all the isolates. All the Gram-negative isolates showed maximum sensitivity to amikacin & imipenem. Interpretation & Conclusion :These findings call for wiser use of antimicrobial agents & their continous in vitro monitoring. [Rahangadale V et al NJIRM 2013; 4(4) : 115-117]

Key Words: Antibiotic resistance , Uropathogens , UTI

Author for correspondence: Dr.Vaishali Rahangdale, 44,Central Excise Layout,Telecomnagar,Near Union Bank,Khamla,Nagpur-440025,Maharashtra state ,India. E-mail-vaishukolher@gmail.com

Introduction: Urinary tract infection (UTI) is among the most common infection described in outpatient setting & hospital patients. Many bacterial species, including E.coli are showing an increasing resistance to antibiotics & E.coli is an important pathogen of urinary tract[1].Multidrug resistance among E.coli isolates have been reported from many parts of the world[2].The increasing prevalence of antimicrobial resistance is a major health problem & is associated with high morbidity & mortality[3].

In almost all cases of UTI,empirical antimicrobial therapy initiates before the laboratory results of urine culture available; thus antibiotic resistance may increase in uropathogens due to frequent uses of antibiotics.Due to this reason ,regular monitoring is required to establish reliable information about susceptibility pattern of urinary pathogen for optimal empirical therapy of patients of UTI[4].So ,the current study is undertaken to retrospectively analyse the antimicrobial resistance pattern of uropathogen during a period of one year in patients of UTI from a largest tertiary care hospital of Central India.

Material & Methods: This is a retrospective study of one year conducted at department of Microbiology, Government Medical College, Nagpur .All the urine samples of clinically suspected UTI patients from medical,gynaecology & surgical wards were included in the study.

Fresh midstream urine samples were aseptically collected in sterile containers. Each sample was plated on 5% sheep blood agar & MacConkey agar plates using a calibrated loop,delivering 0.01 ml of the sample.This was incubated at 37 degree celcius overnight & the observation was made next day.All the plates showing significant growth(> 10 CFU/ml)as per Kass count were further processed [5].Fewer colonies (<10 CFU/ml) were processed only if relevant history was present in the form of fever, chills, flank pain, pyuria,history of antibiotic intake or diuretic ,structural abnormalities,diabetes mellitus or any immunocompromised state.For staphylococcus aureus,even , 10 colonies (<10 CFU/ml) were further processed as this was considered significant[6].After biochemical identification, antimicrobial sensitivity testing was done for the

isolates using Kirby-Bauer methods [7] on Mueller-Hinton agar & results were interpreted as per the CLSI 2011 guidelines[8].

Results: Total of 2991 urine samples were processed .Out of these 241 uropathogens were obtained.The commonest isolate was E.coli (56.1%) followed by the klebsiellae species.(27.6%).Among gram- positive organism S.aureus (1.9%) was most prevalent uropathogen obtained. Table 1 shows antimicrobial resistance pattern of gram-positive isolates. Among this maximum resistance was observed towords Penicillin G followed by erythromycin.All

enterococcal isolates showed maximum resistance to commonly used urinary antibiotic i.e norfloxacin & nitrofurantoin.All Gram-positive isolates were 100% sensitive to vancomycin & Teicoplanin.

Table 2 shows antimicrobial resistance pattern of gram-negative isolates .These isolates showed resistance to all the commonly used antibiotics. The main challenge is the multidrug resistance (i.e resistance to more than 3 drugs) shown by all the isolates.All the Gram-nagative isolates showed maximum sensitivity to amikacin & imipenem.

Table 1 :Antimicrobial Resistance Pattern Of Gram-Positive Isolates:

ORGANISM	P(%)	Ox(%)	Am(%)	No(%)	Nf(%)	Nt(%)	Va(%)	Te(%)	E(%)
S.aureus	71	37	56.3	43.1	62	47	0	0	48
CNS	93	49	86	45.1	72	73	0	0	83
Entero	96.3	-	91	88.2	89	79	0	0	92

Note: CNS –Coagulase negative staphylococci,Entero – enterococci.P-Penicillin, Ox- Oxacillin,Am-Ampicillin,No-Nitrofurantoin,Nf – Norfloxacin ,Nt – Natilmicin,Va-Vancomycin,Te-Teicoplanin,E-Erythromycin.

Table 2 :Antimicrobial Resistance Pattern Of Gram-Negative Isolates:

	Ac(%)	Ce(%)	Cpm(%)	Nf(%)	G(%)	Ci(%)	Nt(%)	Tcc(%)	Pip(%)	Ak(%)	Ip(%)
E.coli	976	82	85.3	61.3	90.9	88	63	60.1	68	37	24
Psuedo	93	91.8	92.7	72.2	89	82		62	69	52	32.1
Kleb	91.1	90.8	92.8	62	73	72	69	63.1	68	42	23
Proteus	94	91	92	66	89.1	89.3	69	69	70	79	18

Note: Ac-Amoxycillin-clavulanic acid,Ce-Cefotaxime,Cpm-cefepime,Ci- Ceftriaxone , Nf – Norfloxacin Tcc-Ticarcillin,Pip-Piperacillin, Ak-Amikacin,Ip-Imipenem.

Discussion: The urine is the most common specimen to be received in Microbiology laboratory.A large spectrum of resistance was observed among β lactam group of drug.This is also reported by a study from Uttarakhand[9]. Nitrofurantoin was found to be the most effective drug in UTI(2).We found a high resistance against this urinary drug.Again, Norfloxacin is considered highly effective in treatment of UTI because of its concentrating ability in urine & high renal clearance[10].Overall resistance to this drug also is not found low in the present study.

The most common uropathogen obtained in our study is E.coli followed by Klebsiella.This is also reported by Hasan et al[10]. Study shows that

multiple resistance is a common problem among hospital pathogens.Higher resistance exhibited to β lactam ,aminoglycosides,fluoroquinolones may have accounted due to increased use of these drugs in these area & referral hospital status of our hospital & prior treatment with multiple antibiotics.However,we had no available data on the use of antibiotics in our hospital to correlate antibiotic consumption with resistance rate.

Overall high resistance to all the primary line of drugs is observed in our study .Increased resistance to second line of drug is also observed in our study which is quiet unacceptable but such type of resistance is also reported by other author[11].The useful drugs for Gram-positive

organisms observed in our study are Vancomycin & Teicoplanin & those for Gram-negative organisms are amikacin & norfloxacin.This finding correlate well with the finding of Hasan et al[10].Although these antibiotics observed to be effective against these uropathogens, use of these drugs should be limited to indications in which this class of agents has clear therapeutic advantage over other antimicrobial agents.

Conclusions: These high rates of resistance are alarming & this information will directly affect selection of empiric therapy for UTI. So, the decision on selection of antibiotic therapy should be made in consultation with microbiologist & pharmacist .All accredited hospitals should have a pharmacy & therapeutic committee that provide a useful forum for coordinated effort for wiser use of antibiotics & continued evaluation of susceptibility pattern to traditional as well as new antimicrobial agents so as to ascertain the optimal empirical therapy. These multidrug resistant isolates are also an indication for need of accurate & updated population surveillance data & wiser use of antimicrobial agents & their continous in vitro monitoring.

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