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RETROSPECTIVE STUDY OF ANTIMICROBIAL DRUG RESISTANCE PATTERN OF UROPATHOGENS IN A TERTIARY CARE HOSPITAL IN SUB URBAN CHENNAI

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ABSTRACT

Introduction: Urinary tract infections (UTI) are the most common reason for patients requiring treatment. There is alarming increase in resistance of bacteria to many routinely used antibiotics. Keeping abreast of the current antibiotic resistance pattern would help institute therapy judiciously. ***Methods:*** A retrospective study of the culture isolates obtained from urine samples received at the Department of Microbiology, Sree Balaji Medical College Hospital, Chennai, India, was carried out from November 2017 to February 2018. ***Results:*** 952urine specimens were received, 28.2% showed significant growth. A total of 230 isolates were used in the analysis. Escherichia coli (51.2%) was the most common Gram-negative bacillus, followed by Klebsiella species (15.3%) and Pseudomonas species (8.8%). The most common Gram-positive organism was Enterococcus. many isolates were resistant to cephalosporins. Resistance to cephalosporins and fluoroquinolones was higher. apart from Klebsiella spp., all other Enterobacteriaceae were susceptible to carbapenems still while fluoroquinolones were also effective. ***Conclusion:*** Due to increasing trends of antibiotic resistance, it is better to have knowledge of the pattern of antibiotic resistance developing currently.[1] This will help initiate culture tests prior to treatment with antibiotics.

KEYWORDS: Antibiotic resistance, uropathogens, gram negative bacillus, Chennai.

INTRODUCTION

Urinary tract infections (UTIs)remain an important cause for patients to visit hospitals. This is the reason many research studies are in UTI.[1] Being informed about current bacteriological profile as well as the antibiotic resistance pattern will arm the medical community to treat these infections. It affects elderly men and women of reproductive age group with pregnancy causing particular concern. UTIs can affect urinary tract at all levels - from urethra to the kidney. It can lead to recurrent UTI, pyelonephritis leading to sepsis, affects pregnant females, and kidney damage in young children. Reasons for UTI can be many gram negative bacteria, few gram positive organisms and some fungi. There could be other reasons like non- culturable organisms and mechanical causes also.

MATERIALS AND METHODS

This is a retrospective study of uropathogens done from November 2017 to February 2018 obtained from 952 urinary samples submitted routinely to the Dept Of Microbiology, Central Laboratory Of Sree Balaji Medical College Hospital, Chennai. Number of isolates obtained was 230. Samples were obtained from various departments like medicine, surgery, obstetrics and gynaecology, paediatrics, ICU etc., in our tertiary care teaching hospital. the isolates were taken by following criteria-

Inclusion criteria: 1. Colony count more than 10^5CFU/ ml for gram negative isolates.

2. Colony count of even less than 10^4CFU/ ml for gram positive isolates

3. Single pathogen

Exclusion criteria: 1. Catheterised urine sample,

2. Repeat specimens.

The samples were plated semi quantitatively with calibrated loops on 5% sheep blood agar plate (HI media) and Mac Conkey agar plates immediately and standard processing protocol was followed. ATCC strains used as Quality controls were Escherichia coli ATCC 25922, Pseudomonas aeruginosa ATCC 27853 and Staphylococcus aureus ATCC 25932 in all aspects of processing. Antimicrobial susceptibility testing was done by Kirby- Bauer disc diffusion testing according to Clinical and Laboratory Standards Institute (CLSI) Guidelines 2017.[3]

RESULTS

The number of urine samples considered for the study was 952. Significant growth was seen in 230(24.2%) of samples. The gender distribution varied across age groups.[2] The isolation of bacteria was significantly higher in the 31-60years age group. The paediatric population had a significant number (6.08%) In boys.

Table 1: Distribution of uropathogens across gender in different age groups. The number of isolates is given with the percentage within parentheses.

Age group(years)	Male- number (%)	female -number (%)
<15	14(6.08)	6(2.60)
16-30	16(6.9)	27(11.7)
31-60	46(20)	47(20.4)
>60	45(19.5)	28(12.17)

Gram-negative bacteria represented 76% of the isolates. It constituted E. coli (51.2%) as the majority followed by Klebsiella spp. (15.3%) and Pseudomonas spp. (8.8%). Among the gram positive organisms, Enterococcus was predominant followed by staphylococcus.[4,5] There were a few cases of Streptococci being isolated. The non - fermentative bacteria comprised of Acinetobacter, Pseudomonas, Proteus and Providencia negligibly.

Table 2: The distribution of uropathogens.

Uropathogens	Number of isolates	percentage
E.Coli	117	51.2
Klebsiella species	35	15.3
Pseudomonas	20	8.8
Proteus	7	3
Providencia	3	1.2
Citrobacter	2	1
Acinetobacter	3	1.5
Enterobacter	2	1
Staphylococcus	1	0.5
Enterococcus	20	9
Candida	17	7.5

The resistance pattern to antibiotics used for urinary infections among these groups shown in Table 3.[4,10] Most of the isolates were resistant to amikacin (78%) and cephalosporins (65%). Resistance of bacteria to cephalosporins and ciprofloxacin) as developed phenomenally. Infections caused by Klebsiella spp. and citrobacter was not easily susceptibile to the antimicrobial agents used for UTI.[7,8]

Table 3: Antimicrobial resistance pattern of the uropathogens isolated(percentage).[4]

isolates	*Ak*	*Gm*	*At*	*cx*	*cr*	*cot*	*Nit*	*Nx*	*Cip*	*Mrp*	*Cz*	*Pit*	*Caz*
E.coli	11.2	15.1	69.1	72.4	4.6	61.2	4.3	76	82.4	6.7	76.6	26.4	47.2
Klebsiella	20	41	6.5	22.7	45.7	32.4	34	54.3	64.6	10.6	67.7	22	38
Pseudomonas	45	19.3	33.7	55.6	86	0	89.3	88.6	67	14.2	36.8	8	10.9
Proteus	28	50	56	76.8	55	63.1	57.4	45.3	44	2	57.8	14.5	18.9
Providencia	0	0	44.5	39	44.7	-	34.5	20.1	34.6	0	45	12	17.8
Citrobacter	1	0	0	0	61.9	30	43.7	54.7	32.7	0	44	0	1
Acinetobacter	49.2	59.1	46.9	89.9	53.3	-	23	87.6	76.5	7.3	89.9	68.9	56.6
Enterobacter	16.1	0	0	99.3	1.3	24.5	1	33.5	42	2	77.4	26	23
Staphylococcus	40	0				55.2				-	-	10	0
Enterococcus	-	20.6				-				-	-	-	-

Ak –amikacin, gm – gentamycin, at – aztreonam, cx- cefotaxime, cr-cefuroxime, nit- nitrofurantoin,cot- cotrimoxazole, cip- ciprofloxacin, mrp- meropenem,pit- piperacillin- tazobactam, caz- ceftazidime.

Bacteria were susceptible to carbapenems (90%), amikacin(83.8%). Nitrofurantoin continues to give good result.(86.3%) Reasonable efficacy was observed with Fluoroquinolones(>90%) for all Gram-positive bacteria isolated.[6] Enterococcus remains susceptible to quite a few antibacterial agents.[9]

DISCUSSION

The role of appropriate medication for UTI cannot be stressed enough given its ability for causing significant morbidity and loss of confidence in the patient. The prevalence and antimicrobial susceptibility of uropathogens varies with time and etiological role is

changing. So observing and reporting the causative agents of UTI is helpful for empirical treatment.

This study throws light on age- and gender-wise distribution of UTI and antibiotic resistance patterns of uropathogens in a teaching hospital in Chennai suburbs.[4,8] Males were predominantly affected among young children and in elderly men. Among the sexes, majority of men were morbid. Likewise, there were young females (16—30 years) afflicted, whereas in the (31-60 years) age group, both men and women were having infection which was in concordance with the other studies. As is common knowledge, females are more prone to develop UTI, mainly due to the location of urethra near anus, and urethra being short, the effect of normal physiological changes during reproductive age and after menopause, sexual intercourse, are factors that affect the urinary tract. To add to all these. the habit of women infrequently voiding due to a number of factors complicates the picture.

The organisms isolated in order of frequency is E. col, followed by Klebsiella spp., P. aeruginosa, and Enterococcus spp. This pattern is consistent with reports of other recently published studies by Kalal et al. But other studies from some different areas have shown different isolation rates. This is attributed to small sample size, population. Non fermentors have become common nowadays as nosocomial organisms capable of easy spread.

The pattern of antibiotic resistance keeps changing. Resistance to amikacin and the four generations of cephalosporins was seen most commonly among Gram-negative bacilli. Ciprofloxacin, Norfloxacin were not helpful even among Gram-negative bacilli. This is similar to previous Indian studies. P.aeruginosa, Acinetobacter spp. and Klebsiella show high levels of resistance. Reason could be mutations in genes.

Carbapenems are cidal for many pathogens in UTI. Injudicious use of antibiotics gives rise to emergence and spread of resistance genes in pathogens. UTI due to these multi-drug resistant bacteria cause sickness – absenteeism, higher treatment costs, increases hospitalisation and increases unwarranted nosocomial infections.[11] Nitrofurantoin and co-trimoxazole are choice antibiotics in uncomplicated UTI. sometimes ciprofloxacin and co-trimoxazole are not recommended empirically. Clinical correlation and culture reports should be considered before starting antibiotics.

Antibiotic stewardship is the need of the hour and a call for rational use of antibiotics by clinicians keeping in mind our limited reserve of drugs like fosfomycin for complicated UTIs. Local Antibiotic resistance Information provided by studies like these can be used to guide antibiotic selection for UTI.

CONCLUSION

The increase in antibiotic resistance pattern is a warning which needs to be heeded. Clinicians can educate patients about the importance of starting antibiotics after urine sample has been given for culture and susceptibility studies and to ensure patient compliance even after symptom relief!

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