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Bacteriological profile and its antibiotic susceptibility in patients with Urinary Tract Infection at Tertiary Care Hospital, Valsad, Gujarat

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Abstract

Introduction: Urinary tract infection is one of the most common bacterial infections seen in humans and major cause of morbidity. The causative agents for urinary tract infection vary from place to place and they also vary in their sensitivity and resistance pattern with the widespread availability of antimicrobial drugs. UTI is difficult to treat because of appearance of pathogens with increasing resistant pattern to antimicrobial drugs.

Aim: This study is carried out to know the bacteriological profile and its antibiotics sensitivity pattern in patients with UTI at tertiary care hospital, Valsad.

Materials and Method: Total 771 mid-stream urine samples were collected from suspected UTI patients. They were tested for bacterial culture and all Culture positive samples were tested for antimicrobial susceptibility by Kirby- Bauer disc diffusion method.

Results: Out of total 771 samples, isolates were detected in 302(39.16%) samples. Incidence of infection was more common in females (55%) as compared to males (45%). *Escherichia coli* (36.75%) was the most common pathogens followed by *Kleseilla* spp. (18.21%), Gram positive organisms (16.22%), *Pseudomonas* spp. (12.25%) and *Candida* spp.(8.60%). Isolated pathogenic organism shows high resistance to commonly use antibiotic and sensitive to higher generation of fluroquinolones and carbapenemase.

Conclusion: In this study, females were mostly affected and most common organisms were *E.coli* and *Klebseilla*. The commonly isolated pathogens have been changing and increasing resistance pattern is observed due to indiscriminate use of antibiotics and alerting us to update effective empirical treatment regularly.

Keywords: Urinary tract infection, Antimicrobial susceptibility, Resistance pattern

Introduction

Urinary tract infections (UTI) are the most common infectious diseases in clinical practice.(1) This problem spans all age groups, beginning from neonates to the geriatrics age group.(2,3) UTI represent the second most common microbial infection after respiratory tract infections, encountered in medical practice.(4) It was estimated that in a year UTI was the cause of 100,000 cases of hospitalizations, 1 million visits to the emergency department and 7 million visits to outpatient department all over the world.(5,6)

UTI is defined as the presence of growth of more than 10^5 colony forming unit (CFU) of bacteria per ml of urine for asymptomatic individual and 10^3 for symptomatic individual.(7) It is estimated that the incidence is greater in women as compare to men due to anatomical predisposition, large bacterial load in urogenital mucosa, sexual activity and pregnancy. Infection in men is uncommon through the 5th decade of life, after that the incidence of infection is high because of enlargement of prostate interferes with emptying of the bladder.(7,8)

The most common pathogenic organisms of UTI are *Escherichia coli*, *staphylococcus saprophyticus* and less common pathogens are *Klebseilla* spp., *Proteus* spp., *Pseudomonas* spp., *Enterococci* spp, and *Candida albicans*.(9) Treatment of UTI cases is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens. UTI caused by bacteria have been showing increasing trends even though there is availability and use of antibiotics.(10)

The extensive and inappropriate use of antimicrobial agents has invariably resulted in the development of antibiotic resistance which in recent years, has become a major problem worldwide.(11) To ensure appropriate treatment, knowledge of the organisms that cause infection and its antimicrobial sensitivity pattern is mandatory.(11,12)

Materials and Method

The study was conducted at Microbiology department, GMERS medical college and hospital, Valsad, Gujarat from January 2014 to December 2015. Total 771 mid stream urine samples were collected from clinically suspected UTI patients. Urine samples were cultured on Nutrient agar, Sheep blood agar by semi-quantitative method and on MacConkey agar.(13,14) All plates were incubated at 37°C aerobically for 24 hours. The plates were examined macroscopically and microscopically for bacterial growth. A growth of $\geq 10^5$ colony forming units/ml consider as significant bacteriuria, according to the standard Kass criteria.(13,15)

Bacterial pathogens were identified by routine gram reactions, motility testing and biochemical reaction as per Standard Microbiology techniques.(13,15)

Antimicrobial susceptibility testing was performed by Kirbey-Bauer disc diffusion method, using commercially available discs on Muller- Hinton agar.[15,16]

Result

The study was conducted from January 2014 to December 2015 at tertiary care hospital Valsad. In study duration, total 771 urine samples were processed, out of which 302 (39.16%) samples shows growth of pathogenic organism. The most common isolated was *E.coli* in 111(36.75%) samples, which was followed by *Klebseilla* spp. 55 (18.21%), *Pseudomonas* spp. 37 (12.25%), *Candida* spp.26 (8.60%), *Enterococcus* spp.19 (6.29%) and *S.aureus* 13 (4.30%). (Table 1) The prevalence rate in female 166 (55%) is more as compare to male 136(45%).

Table 1: Frequency of different isolated organism

Organism	Frequency of isolates in numbers (Percentage)
E.coli	111 (36.75%)
Klebseilla spp.	55 (18.21%)
Pseudomonas spp.	37 (12.25%)
Candida spp.	26 (8.60%)
Enterococcus spp.	19 (6.29%)
Coagulase negative *staphylococcus*	16 (5.29%)
S.aureus	13 (4.30%)
Acinetobacter spp.	11 (3.64%)
Proteus spp.	7 (2.31%)
Providentia spp.	2 (0.66%)
Other organism*	5 (1.65%)

*includes *citrobacter* spp., *morgenella* spp, *S.maltophilia and streptococcus* spp.

In antibiotic susceptibility testing, *E.coli* was highly sensitive to Imipenam (83.78%), Nitrofurantoin (81.08%) and Levofloxacin (72.27%). E.coli was shows resistance to amikacin (38.73%), gentamycin (44.14%) and piperacillin-tazobactum (45%).

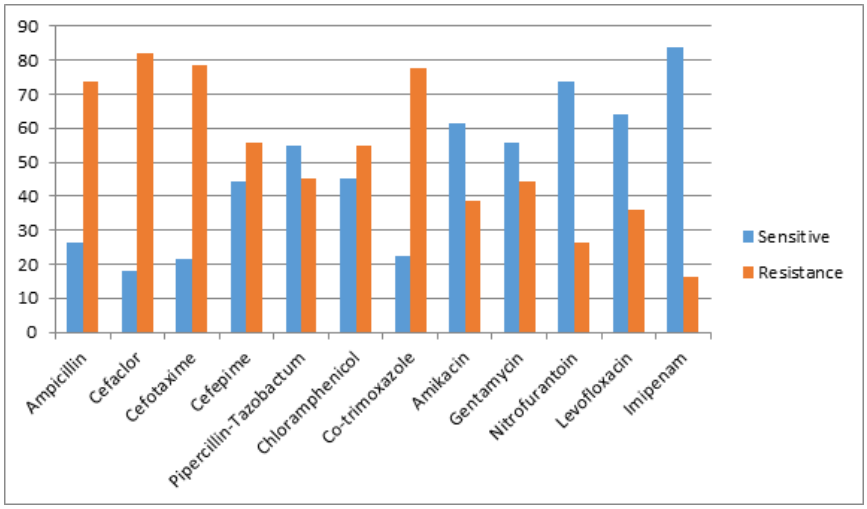

Fig. 1: Antibiotic sensitivity of *Escherichia. coli*

The antibiotic pattern of *Klebseilla* spp shows high sensitivity to levofloxacin, imipenam, amikacin, gentamycin and piperacillin-tazobactum. *Klebseilla* spp. shows high resistance to ampicilline, cefaclor, cefotaxime.(Fig. 2) *Psudomonas* spp. species were highly sensitive to piperacillin-tazobactum, imipenam, amikacin. (Fig. 3)

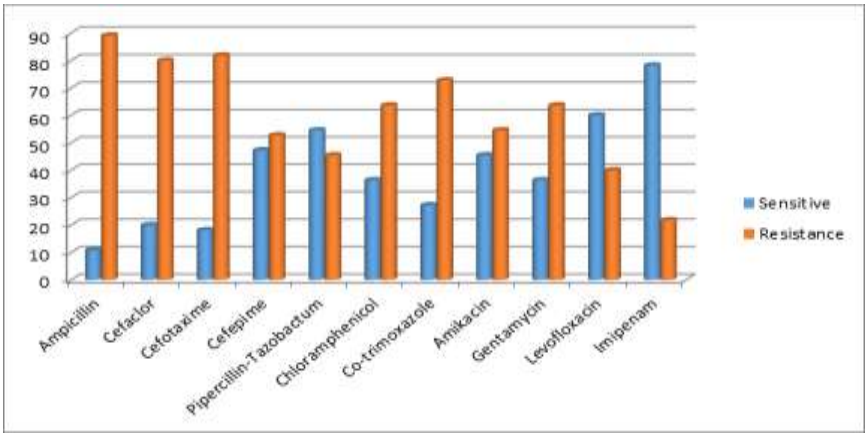

Fig. 2: Antibiotic sensitivity of *Klebseilla* species

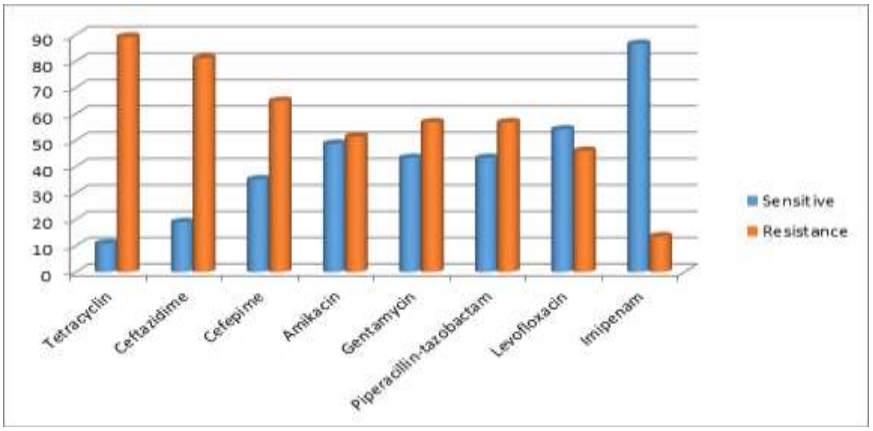

Fig. 3: Antibiotic sensitivity of *Pseudomonas* species

In gram positive organism sensitivity, all organisms *S.aureus, Enterococcus* species and coagulase negative *staphylococcus* are sensitive for vancomycin (100%) and linezolid(100%).(Table 2)

Table 2: Antibiotic sensitivity patterns of gram positive organism

Antimicrobial agents	Sensitivity of orgamism in percentage		
	S.aureus	***Enterococcus* spp.**	**CONS**
Tetracycline	92.30	63.15	81.25
Oxacilline	38.46	21.05	68.75
Azithromycin	30.76	00.00	53.84
Clindamycin	84.61	00.00	81.25
Cotrimoxazole	30.76	00.00	31.25
Chloramphenicol	61.53	47.36	75
Vancomycin	100	100	100
Levofloxacin	76.92	68.42	92.30
Linezolid	100	100	100

Discussion

Urinary tract infection causes major burden in health care services because of high prevalence in community and hospitals by different pathogenic organisms. It also contributes to increasing antimicrobial drugs resistance both at community and hospital level. So continues surveillance of antibiotic sensitivity is necessary at local level for better management of patient by choosing appropriate antimicrobial therapy and to decrease antibiotic drug resistance.

In our study, prevalence of uropahtogens was 39.16%, which was near similar (39.6%) to study done by Nilofar S et al at Anand district, Gujarat.[17] some other studies in India shows prevelance rate from 31-38%.[18,19]

The most common isolate found in our study was *E.coli* (36.75%), which was followed by *Klebseilla* spp. (18.21%) and *Pseudomonas* spp. (12.25%). Our study's

result was comparable to several studies done in India like study done by Dnyaneshwari Ghadage et al, at Pune in 2016 shows *E.coli* isolate rate was 41.3% and *Kleseilla* spp. was 18.5%.[20] Other studies also shows *E.coli*, *Klebseilla* spp. and *pseudomonas* spp. as most common isolated pathogenic organism.[5,17]

In our study, Gram negative organisms show high resistance to ampicilline, cotrimoxazole and 3rd and 4th generation of cephalosporine. Gram negative organisms were more sensitive to imipenam, nitrofurantoin and levofloxacin which are similar as study done in India.[5,21] There is a high resistance developed in ampicilline and cotrimoxazole which were previously used as treatment of choice in last decades but indiscriminate and empirical use of these drugs in every patient resulted in high resistance in these drugs.

Gram positive cocci show 100% sensitivity to vancomycin and linezolid and resistance to azithromycin, cotrimoxazole and oxacilline which are similar to studies done in India.[22,23]

Conclusion

Our study concludes *E. coli* as most common organism causing urinary tract infection with female predominance. There is increasing resistance to commonly used antibiotics due to indiscriminate use of antibiotics without culture and sensitivity report. Periodic antimicrobial sensitivity surveillance is necessary for formulating antibiotic policy and based on antibiotic policy start earlier and effective empirical treatment for better management and reduces morbidity to patients.

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