

## Study of Bacteriological Profile and Antibiogram of Urinary Tract Infections in Patients Attending SVRRGGH, Tirupati.

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### I. Introduction

Urinary tract infection (UTI) is one of the most common infectious diseases in a clinical setting [1] It is also one of the most frequently occurring nosocomial infections [2] Approximately 35% of all hospital-acquired infections are contributed by UTI [2,3]. Prevalence of UTI is 3% in girls and 1% in boys [4]. The incidence is greater in women as compared to men due to anatomical predisposition or large bacterial load in urothelial mucosa or other host factors including obstruction in the urinary tract, sexual activity, and pregnancy [5].

*E. coli* remains the commonest pathogen causing UTI which account for 75-90% and the rest are *Enterococcus*, *Klebsiella*, *Enterobacter*, *Citrobacter*, *Serratia*, *Pseudomonas aeruginosa*, *Providencia*, and *Staphylococcus epidermidis* [6]. There are many types of antibiotics available for UTIs and the choice depends upon many factors including severity of infection and acute or recurrent infection [7,8]. UTIs are often treated with different broad-spectrum antibiotics. Due to aberrant use of antibiotics in practice the prevalence of antimicrobial resistance among urinary pathogens has been increasing worldwide [9,10]. Frequency of resistance to antibiotics is directly linked to consumption of antibiotics.

To aid better decision making the physician must have current knowledge of the organisms and should advise a bacteriological examination of urine sample along with their antibiogram to know the trend of antibiogram of uropathogens in the regions.

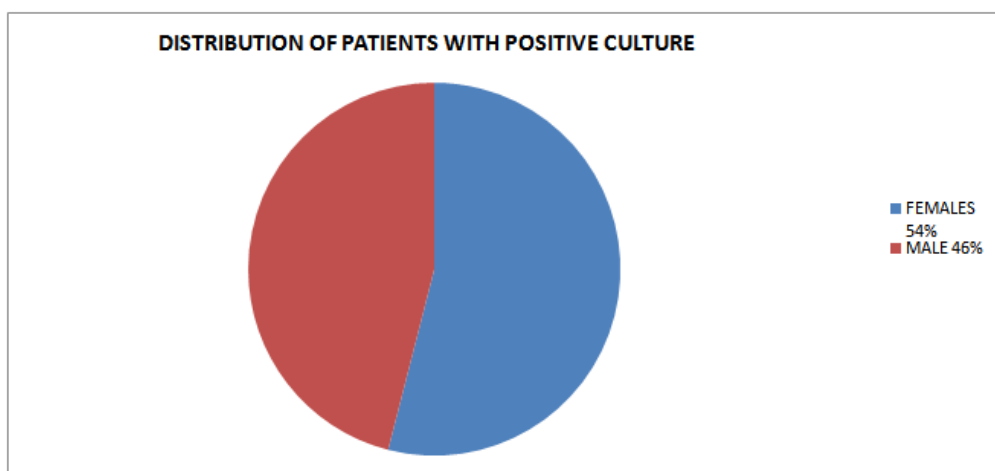
To ensure appropriate therapy, current local based knowledge of the organisms that cause UTI and their antibiotic susceptibility testing is mandatory [11].

### II. Material And Methods

A retrospective study was carried out in the Department of Microbiology, S.V. Medical College, Tirupati over a period of one year from Jan 2018 to Dec 2018. A total of 5100 mid stream urine samples were collected in a sterile wide mouthed containers from suspected UTI patients of all age groups and both genders who attended the OP and IP departments of SVRRGGH, Tirupati. Urine culture was done by a semiquantitative technique. With the help of a calibrated bacteriological loop, urine (0.001ml) was cultured on blood agar and CLED medium. Bacterial pathogens were identified by gram reactions, motility and biochemical characteristics as per standard Microbiological techniques [12]. The antibiotic susceptibility pattern of the isolates was determined by the Kirby-Bauer disk diffusion method [13]. The following antibiotic discs (drug concentrations in µg) were used: amikacin (10), ceftazidime (30), ceftriaxone (30), cotrimoxazole (25), nitrofurantoin (300), imipenem (10) norfloxacin (10) nalidixic acid (30) were used for gram negative organisms. In addition, linezolid (30) and vancomycin (30) were used for gram positive organisms.

### III. Results

A total of 5100 urine samples were processed and 24.21% (1235/5100) samples showed a significant growth out of which 54% (667/1235) were females and 46% (568/1235) were males



The overall infection rate was highest in the age group of 30-50 years. Gram negative organisms contributed to 85.91% and gram positive to 14.09% of infections as shown in the table. Escherichia coli (58.29%) were the predominant uropathogen isolated followed by Klebsiellasp (14%) and Staphylococcus aureus (7.54%).

| Gram negative organisms (N=1061) |             |               |
|----------------------------------|-------------|---------------|
| E.coli                           | 720         | 58.29%        |
| Klebsiella                       | 173         | 14%           |
| Proteus                          | 70          | 5.67%         |
| Pseudomonas                      | 63          | 5.11%         |
| Acinetobacter                    | 35          | 2.84%         |
| <b>Total</b>                     | <b>1061</b> | <b>85.91%</b> |
| Gram positive organisms (N=174)  |             |               |
| S. aureus                        | 93          | 7.54%         |
| Enterococcus                     | 81          | 6.55%         |
| <b>Total</b>                     | <b>174</b>  | <b>14.09%</b> |

Antibiotic susceptibility pattern among gram negative bacilli has shown maximum sensitivity to Imipenem followed by nitrofurantoin, amikacin, nalidixic acid, norfloxacin. Maximum resistance was seen against ceftazidime, ceftriaxone and cotrimoxazole as depicted in table. Gram positive organisms showed 100% susceptibility to vancomycin and linezolid followed by nitrofurantoin, imipenem, amikacin, cotrimoxazole, norfloxacin and maximum resistance was shown to ceftriaxone.

#### Antibiogram of Gram negative isolates (N=1061)

| Antimicrobial agents | Sensitive | Resistant | Percentage of resistance |
|----------------------|-----------|-----------|--------------------------|
| Imipenem             | 926       | 135       | 12.72                    |
| Nitrofurantoin       | 915       | 146       | 13.76                    |
| Amikacin             | 896       | 165       | 15.55                    |
| Nalidixic acid       | 784       | 277       | 26.10                    |
| Norfloxacin          | 762       | 299       | 28.18                    |
| Cotrimoxazole        | 664       | 397       | 37.41                    |
| Ceftriaxone          | 644       | 417       | 39.30                    |
| Ceftazidime          | 578       | 483       | 45.52                    |

#### Antibiogram of Gram positive isolates (N=174)

| Antimicrobial agents | Sensitive | Resistant | Percentage of resistance |
|----------------------|-----------|-----------|--------------------------|
| Vancomycin           | 174       | Nil       | Nil                      |
| Linezolid            | 174       | Nil       | Nil                      |
| Nitrofurantoin       | 164       | 10        | 5.74                     |
| Imipenem             | 153       | 21        | 12.06                    |
| Amikacin             | 148       | 26        | 14.94                    |
| Cotrimoxazole        | 136       | 38        | 21.83                    |

|             |     |    |       |
|-------------|-----|----|-------|
| Norfloxacin | 132 | 42 | 24.13 |
| Ceftriaxone | 125 | 49 | 28.16 |

#### IV. Discussion

Urinary tract infections (UTI) are amongst the most common infections encountered in clinical practice and are a common clinical condition worldwide. But the pattern of antimicrobial resistance varies in different regions. UTI is the most predominant in reproductive age group 30-50 years which might be due to frequency of sexual intercourse.

Our findings are in accordance with other studies [4,16] which indicated that females (54%) have a notable frequency of UTI when compared to males (46%). This difference in frequency could be due to several clinical factors, including anatomic differences, hormonal effects and behavioral patterns [14,15]. But the pattern of antimicrobial resistance varies in different regions. The most common uropathogens in our study were *E. coli* (58.29%) and *Klebsiella* spp (14%).

It supports the previous findings indicating that *E. coli* is the principal etiological agent of UTI, accounting for 60.02% of the cases [16]. In another study, it was reported that predominant uropathogens are *E. coli* followed by *Klebsiella* species which also support our study [17].

In our study, Gram positive organisms accounted for a total of 14.09% of urinary tract infections (174 out of 1235). This finding is similar to other studies [18,19].

Gram negative organisms are more sensitive to imipenem, nitrofurantoin and amikacin, while less sensitivity shown to ceftazidime, cotrimoxazole and ceftriaxone which is similar to study done by Niranjana et al in Puducherry, India. [20]. Resistance to antibiotics like norfloxacin, cotrimoxazole, and third generation cephalosporin (eg. ceftriaxone) is very high. Such findings are attributed to excessive use of antibiotics in both community and hospital settings, uncontrolled prescription practices and incomplete dosage consumption by patients. Another oral antibiotic nitrofurantoin was found to be more effective in treatment of UTI in our study and the findings are in agreement with similar surveillance studies by Sasirekha and Khamenehand other Indian studies, which have demonstrated nitrofurantoin as an appropriate agent for first line treatment of community acquired UTI. [21,22]. Low antimicrobial resistance for nitrofurantoin can be attributed to its localized action on urinary tract and not being exposed outside urinary tract. [23]

#### V. Conclusion

In this study, most common causative agent of urinary tract infection is *Escherichia coli*. Antibigram pattern of this study shows maximum resistance to cephalosporins due to indiscriminate use of these antibiotics. High susceptibility rates were observed against imipenem followed by nitrofurantoin. In order to guide the clinicians in the rational use of antibiotic therapy, to prevent misuse or overuse of antibiotics, antibiotic susceptibility patterns must be continuously and periodically evaluated.

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