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Microbiological Profile and Antibiotic Susceptibility Pattern of Uropathogens in a Tertiary Care Hospital.

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ABSTRACT

Urinary tract infection is one of the most common infectious diseases in humans that occur in both community and hospital environments. Resistant strains may develop in uropathogens due to extensive use of antibiotics. Among the 2859 urine samples analyzed, 237(8.3%) samples were found to show significant bacteriuria. *E. coli* 173 (73%) was found to be the predominant isolate. Higher sensitivity was observed for carbapenems followed by fosfomycin, nitrofurantoin, and amikacin. Reduced sensitivity rate was observed for cephalosporins and fluoroquinolones. Current knowledge of susceptibility pattern of uropathogens is crucial for successful prescription of antibiotics empirically, which helps in reducing the emergence and spread of resistance among bacterial pathogens.

Keywords: uropathogens, urinary tract infection, bacteriuria, antibiotic resistance

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INTRODUCTION

Urinary tract infection (UTI) is a condition in which one or more parts of the urinary system (the kidneys, ureters, bladder, and urethra) become infected. UTI is the most common of all bacterial infections, occurring from the neonate to the geriatric age group [1, 2]. Women are commonly affected with an estimated incidence of 0.5–0.7 infections per year [3]. About 70% to 95% of community acquired UTI is caused by Uropathogenic Escherichia coli (UPEC) [4]. Infected patients are treated with antibiotics empirically before the laboratory results of urine culture are available [5]. Resistant strains may develop in uropathogens due to extensive use of antibiotics [6-8]. Therefore, current knowledge of the organisms that cause UTI and its susceptibility to routinely used antibiotics are necessary for appropriate treatment. Hence, the present study was aimed to ascertain the microbiological profile and antibiotic susceptibility pattern of uropathogens in a tertiary care hospital.

MATERIALS AND METHODS

A total of 2859 urine samples were included in this study. The samples were collected (between the months of April 2012 to September 2012) in sterile containers from suspected urinary tract infection cases attending both in-patient and out-patient department of the ESIC Medical College and Post Graduate Institute of Medical Sciences and Research, Chennai, India. 0.01 ml of urine was inoculated on to Cysteine lactose electrolyte deficient (CLED) agar using standard calibrated loop and incubated aerobically at 37°C overnight. After incubation, if the colony forming units (cfu)/ml are more than 10^5, it is considered as significant bacteriuria and the colonies were further processed and identified using standard biochemical tests [9]. Antimicrobial susceptibility testing was performed using the disk-diffusion method according to CLSI guidelines (CLSI, 2012).

RESULTS AND DISCUSSION

Among the 2859 urine samples analyzed, 237(8.3%) samples were found to be significant bacteriuria. Out of 237 positive cases, the most common isolate was *E. coli* 173 (73%), followed by *Klebsiella pneumoniae* 20(8.5%), *Pseudomonas aeruginosa* 19(8%), *Citrobacter freundii* 14(5.9%), *Enterobacter* species 6(2.5%), *Proteus* species 3(1.3%) and *Acinetobacter* species 2(0.8%) (Table 1). Majority of the isolates were found to be sensitive to imipenem (98%), meropenem (98%), fosfomycin (97%), nitrofurantoin (84%) and amikacin (72%). Low sensitivity rate was observed for cephalosporins viz., cephalexin (14%), cefuroxime (24%), ceftriaxone (37%), ceftazidime (38%), cefotaxime (38%) and cefixime (35%). Bacterial resistance to β-lactam antibiotics has significantly increased in recent years. Some of these organisms have produced new forms of the older enzymes such as the extended-spectrum β-lactamases (ESBLs) that can hydrolyze cephalosporins and aztreonam [10]. Reduced percentage of sensitivity was observed for fluoroquinolones such as ciprofloxacin (28%), norfloxacin (25%), gatifloxacin (25%), levofloxacin (28%) and this finding correlates with previous reports [13-15]. (Table 2).

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Table 1: Microorganisms isolated from patients with urinary tract infection		
Organism	**Positive cultures (n=237)**	**Positive %**
Escherichia coli	173	73
Klebsiella pneumoniae	20	8.5
Pseudomonas aeruginosa	19	8
Citrobacter spp.	14	5.9
Enterobacter spp.	6	2.5
Proteus spp.	3	1.3
Acinetobacter	2	0.8

Table 2: Overall sensitivity pattern of individual antibiotics		
Antibiotics	**Number of sensitive isolates**	**Percentage of sensitivity**
Amoxicillin-clavulanic acid (20/10µg)	173	73
Piperacillin-tazobactam (100/10µg)	154	65
Cephalexin (30µg)	33	14
Cefuroxime (30µg)	56	24
Ceftriaxone (30µg)	87	37
Ceftazidime (30µg)	90	38
Cefotaxime (30µg)	90	38
Cefixime (5µg)	83	35
Cefpodoxime (10µg)	85	36
Imipenem (10µg)	232	98
Meropenem (10µg)	232	98
Amikacin (30µg)	170	72
Gentamicin (10µg)	109	46
Tobramycin (10µg)	104	44
Netilmicin (30µg)	142	60
Nalidixic acid (30µg)	71	30
Ciprofloxacin (5µg)	66	28
Norfloxacin (10µg)	59	25
Gatifloxacin (5µg)	59	25
Levofloxacin (5µg)	66	28
Cotrimoxazole (1.25/23.75µg)	78	33
Fosfomycin (200µg)	230	97
Nitrofurantoin (300µg)	199	84

CONCLUSION

In our study, gram negative pathogens were isolated in highest percentage than gram positive pathogens. The uropathogens showed higher sensitivity to the carbapenems. The next alternative for treating UTI is fosfomycin and nitrofurantoin, followed by amikacin.

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Data and knowledge generated from our own set up on the bacterial flora and sensitivity pattern of pathogens are very important for selecting an empirical antimicrobial therapy which will help in reducing the emergence and spread of resistance among bacterial pathogens.

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