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Study of Prevalence and Antimicrobial Susceptibility Pattern of Uro-Pathogenic Escherichia Coli among Patients in Private Hospital Chennai

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Abstract: ***Background & objectives: Escherichia coli causing urinary tract infection (UTI) especially among patients and antibiotic resistance pattern is increasing .so we undertook this study to know the antibiotic resistance pattern of E. coli causing UTI in patients hospital in south India, and to know its antibiotic sensitivity pattern. Methods: 210 samples of urine of ICU patients which had significant bacterial grown in culture and antibiotic sensitivity pattern was taken from microbiology lab samples were processed using standard methods and by using Kirby-Bauer disk diffusion test, antibiotic susceptibility was checked. Results: 500 cases were taken from ICU patients for urine culture, 110 case had E. coli in culture, 81 (73.6%) were multi drug resistant (MDR). The isolates showed high levels of resistance to Ampicillin (76%), cefotaxime (61.5%), ceftriaxone (61.5%), norfloxacin (53.8%), and co-trimoxazole (46.2%). The isolates were sensitive to meropenem (83%), amikacin (81%), levofloxacin (81%), piperacillin-tazobactum (83%), nitrofurantoin (72%) and imipenem (84%). Ceftriaxone was most commonly used for empirical therapy for UTI among in patients in our hospital. Interpretation & conclusions: This study showed that 73.6 percent of E. coli, isolated from urine samples of patients were MDR. The use of empirical therapy with cephalosporins in patients has led to increased antibiotic resistance.***

Keywords: Antimicrobial resistance - Escherichia coli - MDR – UTI- ICU

1. Introduction

Urinary tract infection is commonly caused by Gram negative bacteria like Escherichia coli, Enterobacter species, Klebsiella species, Proteus species and gram-positive bacteria like Enterococcus species, and Staphylococcus saprophyticus. E. coli is the most common organism causing UTI[1]. Usually treatment of UTI is empirical, however in view of increasing antimicrobial resistance among uropathogens antimicrobial susceptibility testing becomes the basis for antimicrobial therapy.

Various studies from many parts of India have showed increase resistance of antibiotics among E. coli. Previous study[1-5] have showed that E. coli resistant rates to following drugs like quinolones(74.5%), beta-lactams (57.4%), gentamycin (58.2%), co-trimoxazole (48.5%), nalidixicacid (77.7%), amikacin (33.5%). Treatment of Multidrug resistance (MDR) E.coli causing UTI increases the cost of treatment, hospital stay, morbidity and mortality in patients especially in India[6,7.]

This study was taken to study the prevalence of E. coli causing urinary infections and its antibiotic sensitivity pattern in ICU patients admitted in private hospital in Chennai in south India.

2. Materials and Methods

The culture analysis was done on all urine samples obtained from out patients and inpatients from September 2015 toSeptember 2016. Further sensitivity analysis on E. coli isolates obtained from these samples was done. Ethical clearance for the study was obtained from the hospital ethical committee.

Urine culture was done by standard loop method, and the organisms isolated from urine culture were identified by standard methods[4]. The antimicrobial sensitivity test was done on Mueller-Hinton agar by Kirby-Bauer disc diffusion test as per Clinical and Laboratory Standard Institute (CLSI) guidelines[8]. The isolates were tested for Ampicillin (10 µg), Cefotaxime (30µg), Ceftriaxone (30µg), meropenem(10µg), ceftazidime(30µg), levofloxacin (30µg), norfloxacin (10µg), nitrofurantoin (300µg), amoxicillin-clavulanic acid (10/20 µg), co-trimoxazole (1.25/23.75 µg), nalidixic acid, ciprofloxacin (5µg), amikacin (30 µg), piperacillin-tazobactam (100/10 µg). If an isolate is found to be resistant to three or more antimicrobials belonging to different classes/groups of antimicrobials, then an isolate is considered as MDR.

The patient's details were collected from case sheets in the Medical Records Department and wards. Proportions were used to study the resistance pattern of E. coli.

3. Results & Discussion

A total of 500 urine samples were received for culture and sensitivity during the study period. Among these, 210 samples (42%) yielded significant bacteriuria; 280 samples (56%) showed no growth or insignificant bacteriuria and 10 samples (2%) showed mixed growth.

Table I shows various organisms isolated from urine culture are shown. E. coli was the commonest organism accounting for 59 per cent of the uropathogens.

The E. coli isolates were sensitive to meropenem (83%), amikacin (81%), piperacillin-tazobactum (83%), levofloxacin (81%), nitrofurantoin (72%) and imipenem (84%). The sensitivity to Ampicillin, ceftazidime, norfloxacin, ceftriaxone, ciprofloxacin, cefotaxime varied from 11-24 per cent.81 of 210 (73.6%) E. coli isolates were multi drug resistant.

For 50 patients, empirical treatment was started during the analysis. In 30 cases ceftriaxone was started, in 10 cases cefotaxime was used, remaining few Ampicillin, norfloxacin, and ciprofloxacin. Antibiotics were started for various other diseases like lower respiratory tract infection, septicemia.

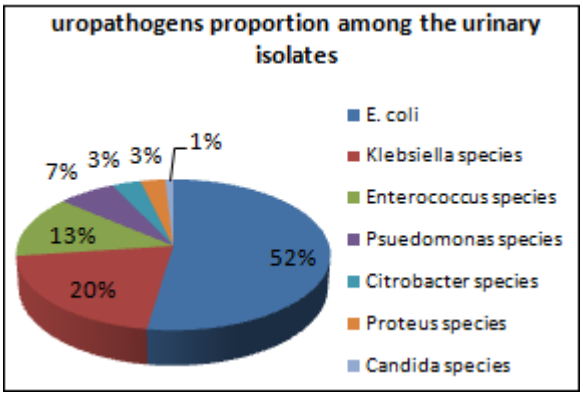
The most common risk factor associated with MDR E. coli were diabetes mellitus, followed by renal pathologies like, chronic renal disease, hydroureteronephrosis (HUN), and prostatic enlargement.

Comparison of resistance pattern of E. coli–uropathogenic: 76% of E. coli was resistance to Ampicillin, 53.9% resistance to Ceftazidime, 55.4% to ciprofloxacin, 64.6% to nalidixic acid, 61.5% to Ceftriaxone, 61.5% to Cefotaxime, 53.8% to norfloxacin,cotrimoxazole-46.2%, but Colodner et a[9] study showed 66% of E. coli resistant to Ampicillin, 6% to Ciprofloxacin, 26% to Cotrimoxazole, 1% to Nitrofurantion, Andrade et al[10] study showed 53.6% to Ampicillin, 21.6% to ciprofloxacin, 40.4% to Cotrimoxazole, 6.6% to Nitrofurantoin. Kothari and Sagar[1] study showed 85.3% resistance to Ampicillin, 72% to ciprofloxacin, 74% to Cotrimoxazole, and 24.4% to Nitrofurantoin. According to Akramet al[4] E. coli was resistant to Ciprofloxacin 68%, Cotrimoxazole 76%, Nitrofurantoin 80%. Biswas et al[11]study showed E. coli resistant to Ampicillin 63.6%, Ciprofloxacin 35.1%, Cotrimoxazole 40.3%, Nitrofurantoin 9.3%. Study by Farrell et al[12]showed that E. Coli is resistant to Ampicillin 48.7%, Ciprofloxacin 2.3%, Nitrofurantoin 3.7%.

A study by Sahm et al[13]in USA showed that prevalence of MDR E. coli was 7.1%, butstudies by Niranjan et al[14](76.51%)andSumera Sabir et al[15] (81%) correlated to our study which showed 73.6%.

Various studies from India reported that E. coli is the commonest organism causing UTI[1-3]. Even our study showed that E. coli was the commonest organism causing UTI followed by Klebsiella species.

In **conclusion**, this study showed that E. coli is more common organism causing UTI among patients, and it showed high resistance to aminopenicillin, cephalosporins and fluoroquinolones.



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