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Original Research Article

Antimicrobial Susceptibility Profile of Urinary Isolates of Escherichia Coli and Klebsiella Pneumoniae

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ABSTRACT

Background: UTI forms the largest single group of hospital acquired infections and accounts for about 35 % of total nosocomial infections.
Aims: To determine antimicrobial resistance among uropathogenic *Escherichia coli* and *Klebsiella pneumoniae* for judicial use of drugs and proper institution of therapy.
Materials and Methods: The organisms were isolated and identified as per standard protocol and were further subjected to Antimicrobial susceptibility testing as per CLSI guidelines.
Results: A total 300 urinary isolates were studied out of these 228 were *Escherichia coli* and 72 were *Klebsiella pneumoniae*. Antimicrobial susceptibility of *E Coli* & *K. pneumoniae*, showed 100% sensitivity to Imipenem and 77.19% & 68.05 % were sensitive to Amikacin respectively.

Key Words: *AST, Uropathogenic Escherichia coli and Klebsiella pneumonia.*

INTRODUCTION

Gram negative enteric constitutes a serious problem in urinary tract infection in many parts of the world. It has been estimated that symptomatic urinary tract infections (UTI) occurs in as many as 7 million visits to emergency units and 100,000 hospitalizations annually. UTI has become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections, and it is the second most common cause of bacteremia in hospitalized patients. [1-3] It results in significant morbidity and high medical cost. [4]

Escherichia coli account for approximately 80% of the Urinary tract infections. *Klebsiella species* accounts for approximately 17% of the nosocomial urinary tract infections. [5]
Urinary tract infections are often treated with broad spectrum antibiotics. [6,7]
Cephalosporins are used in the treatment of urinary tract infections. [8]

Gram negative organisms exhibit resistance to antimicrobial agents through various mechanisms like target site modification, altered Penicillin Binding protein, poor diffusion or altered porins, active efflux mechanism, and producing inactivating enzymes. [9]

This study is an attempt to evaluate antimicrobial susceptibility in the uropathogenic *Escherichia coli* and *Klebsiella pneumoniae* for proper institution of therapy.

MATERIALS AND METHODS

Present study was conducted at department of microbiology, MGM Medical College, Aurangabad, during the period of August 2010 to March-2013.

All urine samples were inoculated on 5% sheep blood agar & McConkey's agar plates using calibrated loop and incubated aerobically at 37^0C. After overnight incubation, plates were observed for bacterial growth. The organisms were identified as per standard protocol. [10]

Clinically significant isolates of *E. coli* & *K. pneumoniae* were further subjected to antimicrobial susceptibility testing by Kirby-Bauer disc diffusion method [11] on Muller Hinton Agar (MHA) paltes using Cefoxitin 30 µg, Cefuroxime 30µg, Cefpodoxime 30 µg, Ceftriaxone 30µg, Ceftazidime 30µg, Cefotaxime 30µg, Aztreonam 30 µg, Cefepime 30 µg, Imipenem 10µg, Ofloxacin 5µg, Nitrofurantoin 100µg, Amikacin 30µg, Co-trimoxazole 25µg as per CLSI guidelines. [12]

Quality control was done using *E.coli* ATCC-25922 and *K. pneumoniae* ATCC-700603 strains.

OBSERVATION AND RESULTS

A total of 300 urinary isolates were studied, out of these 228 isolates were *E. coli* and 72 isolates were *K. pneumoniae* which were further subjected to antimicrobial susceptibility testing.

Table-1: Distribution of urinary isolates of *Escherichia coli* & *Klebsiella pneumoniae*

Escherichia coli	*Klebsiella pneumonia*	Total
228 (76%)	72 (24%)	300

Table-2: Antimicrobial susceptibility pattern of isolates of *E. coli* & *K. pneumoniae.*

	Escherichia coli (n=228)		*Klebsiella pneumoniae* (n=72)	
Antibiotics	Sensitive	Resistant	Sensitive	Resistant
Amikacin	176(77.19%)	52(22.81%)	49(68.05%)	23(31.95%)
Ofloxacin	97(42.54%)	131(57.46%)	34(47.22%)	38(52.78%)
Nitrofurantoin	159(69.73%)	69(30.27%)	34(47.22%)	38(52.78%)
Cotrimoxazole	100(43.85%)	128(56.15%)	29 (40.27%)	43(59.73%)
Cefuroxime	85(37.8%)	143(62.2%)	21(29.16%)	51(70.84%)
Cefixime	93(40.78%)	135(59.22%)	31(43.05%)	41(59.95%)
Imipenem	228(100 %)	00 (0.0%)	72 (100%)	00 (0.0%)
Aztreonam	86(37.71%)	142(62.29%)	29(40.27%)	43(59.73%)
Cefpodoxime	80 (35.08%)	148(64.91%)	27 (40.27%)	45(61.1%)
Ceftriaxone	93 (40.78%)	135(59.22%)	33 (45.83%)	39(54.17%)
Cefoxitin	152(66.66%)	76 (33.34%)	54 (75%)	18 (25%)
Cefepime	133(58.33%)	95 (41.67 %)	40(55.55%)	32(44.45%)
Cefotaxime	85(37.8%)	143(62.2%)	27(37.5%)	45(61.1%)
Ceftazidime	92 (40.35%)	136(59.64%)	28 (64.92%)	44 (62.5%)

Antimicrobial susceptibility revealed that 100 % isolates of *E. coli* & *klebsiella pneumoniae* were sensitive to Imipenem followed by Amikacin 77.19% &68.05% respectively. Susceptibility data of the isolates given in table-2

DISCUSSION

An extensive use of beta-lactam antibiotics in hospitals and communities has created major problems leading to increased morbidity, mortality and health care cost. [13]

Knowledge on local antimicrobial resistance trends among urinary isolates is important not only in guiding clinicians to prescribe appropriate antibiotics but also for evidence based recommendations in

empirical antibiotic treatment of urinary tract infection. [13]

The prime step before initiating the antimicrobial therapy of infected individuals is performing the antimicrobial susceptibility testing for clinical isolates to avoid indiscriminate usage of antibiotics on trial and error basis.

In present study, 300 uropathogens were isolated. Out of these, 228 (76%) isolates were *E. coli* & 72(24%) were *K. pneumoniae* indicating *E. coli* is predominant uropathogen. This is in concordance with studies reported by Shobha *et.al* [14] and Tankhiwale *et.al.* [8] [*E.coli* 171(57%), *K. pneumoniae* 119 (39.7%) and *E. coli* 54(49.8%), *K. pneumoniae* 46(37.8%) respectively].

All the isolates were further subjected to antimicrobial susceptibility testing as per CLSI guidelines and it revealed that, both *Escherichia coli* and *Klebsiella pneumoniae* were 100% sensitive to Imipenem which is in accordance with Taslima Taher Lina et.al. [15] According to Franklin et.al [16] Imipenem is the most active agent against Gram-negative isolates, which correlates well with this study.

In present study, E Coli and K pneumonia were 64.91% & 61.1% resistant to cefpodoxime respectively. R. Eshwar Singh et.al [17] observed that, all E. coli and K. pneumoniae isolates were uniformly resistant to cefpodoxime which is in accordance with present study.

In present study, E. coli & K. pneumoniae were 62.2% & 61.1% resistant to cefotaxime respectively. Which is in accordance with Nwosu et.al, [18] reported 66.41% resistant to E. coli & 72.3% in K. pneumonia.

Antimicrobial resistance often leads to therapeutic failure of empirical therapy; knowledge of the local prevalence of pathogens and their antibiotic susceptibility pattern is essential for clinicians in their routine work. Clinician should also be aware of the sensitivity patterns in both neighboring and distant areas.

This study reveals the antimicrobial susceptibility patterns of uropathogenic *E. coli* and *K. pneumoniae.*

CONCLUSION

Emergence of drug resistance among *E. coli* and *K. pneumoniae* organisms has left us very few therapeutic alternatives to treat such infections. So it is mandatory to do antimicrobial susceptibility testing for judicial use of drugs and proper institution of therapy.

In conclusion, our study reinforces the necessity of appropriate use of antibiotics and with the technical ability we now need to study drug resistance at genetic level to monitor more detailed patterns of emergence.

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