

Antibiotic Susceptibility Pattern of Urinary Isolates in Imphal (Manipur), India

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ABSTRACT

The present study was conducted to detect aerobic causative agents of urinary tract infection (UTI) and their antibiogram pattern. This study was carried out in the Department of Microbiology, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India. A total of 1,109 clean caught midstream urine samples were collected, out of which 459 (40.4%) samples grew potential pathogens causing UTI. *Escherichia coli* were the predominant 334 (72.8%) bacterial pathogen followed by *Klebsiella* species 66 (14.4%), non lactose fermenters 19 (4.1%), *Pseudomonas* species 16 (3.5%) and others. Most of the strains of *E. coli* were resistance to Ciprofloxacin whereas sensitive to Aminoglycoside. Most of the urinary isolates showed high degree of resistance to Tetracycline, Norfloxacin and Cotrimoxazole. Gentamycin was the drug of choice for most of the strains.

Key words: UTI, *Escherichia coli*, antibiotic susceptibility, Imphal, India.

INTRODUCTION

Despite the widespread availability of antibiotics, urinary tract infection (UTI) remains the most common bacterial infection in the human population.¹ Antibiotics are usually given empirically before the laboratory results of urine cultures are available. To ensure appropriate therapy, current knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory.² Incidence of infection is higher in women, and 20.0-50.0% of whom will suffer a clinical episode during their lifetime.³ Approximately 5.0-6.0% of girls have at least one episode of bacteriuria between first grade and their graduation from high school, and as many as 80.0% of these children experience recurrent infections.⁴ Bacteriuria occurs in 2.0-7.0% of pregnant women; of those who are not bacteriuric at initial screening, 1.0-2.0% will develop bacteriuria later in the pregnancy.^{5,6} Much of the data is available for community acquired infections. This may be different from that of hospital acquired infections. Since patterns of antibiotic resistance in a wide variety of pathogenic organisms may vary even over short periods and depend on site of isolation and on different environments, periodic evaluation of antibacterial activity is needed to update this information.^{7,8}

For appropriate treatment of UTIs, it is essential to isolate the infectious agent from the patient and then determine the sensitivity or the resistance to antimicrobial agents used in therapy. The choice of antibiotics for treatment of UTIs should be, therefore, based on antibiotic susceptibility data. Hence, the present study was conducted to determine the antibiotic susceptibility patterns of the organism isolated from patients with UTIs in Imphal (Manipur), India.

MATERIALS AND METHODS

This study was carried out in the Department of Microbiology, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India to determine the antibiotic sensitivity pattern of the pathogens isolated from UTI. A total of 1,109 mid-stream urine samples (in a sterile wide mouth container) were collected during the period of January 2001 to April 2004. Urine samples were collected before the start of antibiotic therapy. All the urine samples were processed within one hour after the collection for aerobic bacterial culture.

A standard loop technique was used to place 0.01 ml of urine on Blood and MacConkey agar media. Plates were incubated at 37⁰ for 16 to 18 hours. The number of viable bacterial colonies were counted by semi-quantitative method.⁹ Organisms were identified by doing standard biochemical tests.¹⁰ Antibiotic susceptibility testing was done according to Kirby-Bauer's disc diffusion method for all the isolates.⁹ The antibiotics used were Nitrofurantoin (100mcg),

Norfloxacin (10mcg), Ciprofloxacin (5mcg), Gentamycin (10 mcg), Tetracycline (30mcg), Cotrimoxazole (25mcg), Cefotaxime (30mcg) and Nalidixic acid (30mcg).

RESULTS

Out of 1,109 samples tested, 459 (40.4%) samples showed bacterial pathogens responsible for UTI. *Escherichia coli* was the commonest organism followed by *Klebsiella* and others (Table-1). Most of the strains of *E. coli*, *Klebsiella* species, coagulase negative *Staphylococci*, *Pseudomonas* species showed resistance to Tetracycline and Norfloxacin. Most of the strains isolated were sensitive to Gentamycin whereas Cotrimoxazole showed resistant to most of the *E. coli* strains. Most of the strains of *E. coli* also showed resistance to Ciprofloxacin (Table-2).

DISCUSSION

The total growth positive rate (40.4%) observed in this study was higher in comparison to the finding of Akram *et al*¹¹ (10.8%) from India and Chhetri *et al*¹² (21.8%) from Nepal. However, this was in agreement with another study conducted by Rai *et al*¹³ (37.4%) in Kathmandu, Nepal.

In this study, *E. coli* (72.8%) was the predominant bacterial pathogen followed by *Klebsiella* species, non-lactose fermenters, *Pseudomonas* species and others. This was similar to other studies.¹²⁻¹⁶ In contrast to this finding, one study from Aurangabad showed *Klebsiella* as the commonest isolate followed by *E. coli*, *P. aeruginosa* and *S. aureus*.¹⁷ This may be due to the fact that the *Klebsiella* is one of the most important organism causing nosocomial infection.

Present study showed high rate of resistance to ciprofloxacin for *E. coli* which is one of the most recommended drug for the treatment of UTI. This study is similar to the study conducted by Kumari *et al*.¹⁵ This indicates that there is haphazard use of ciprofloxacin due to lack of antibiotic policy. Current study showed higher rate of sensitivity toward aminoglycoside for *E. coli*, *Klebsiella* species and non-lactose fermenters. This study is reinforced by the study conducted by Mutate *et al*.¹⁸ The urinary isolates showed high degree of resistance to tetracycline, norfloxacin and cotrimoxazole in our study. Cotrimoxazole in the present study was no longer found to be effective for UTI caused by *E. coli*. The above mentioned result correlated with the study done by Babypadmini.¹⁹ In the study of Rai *et al*,¹³ Cephalixin (100.0%) and Nitrofurantoin (77.2%) were most effective against gram-negative and gram-positive urinary isolates.

Indiscriminate use of antibiotic has lead to the development of resistance strains. Thus, a detail study is required with regard to antibiotic usages, susceptibility testing irrespective of the organisms isolated from urine to find out the resistance pattern. This would not only help in the proper treatment of the patients but would also discourage the indiscriminate use of the antibiotics and prevent further development of bacterial drug resistance.

Conclusively, resistance rates among common uropathogens continue to evolve and appear to be increasing too many commonly used antimicrobial agents especially to quinolones. Continued surveillance of resistance rates among uropathogens is needed to ensure appropriate recommendations for the treatment of the infections.

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Table-1: Organisms isolated from urine samples.

Bacterial isolates	Isolates n	%
<i>Escherichia coli</i>	334	72.8
<i>Klebsiella</i> species	66	14.4
Non-lactose fermenters	19	4.1
<i>Pseudomonas</i> species	16	3.5
<i>Enterococcus</i> species	11	2.4
Coagulase -ve <i>Staphylococci</i>	11	2.4
<i>Proteus</i> species	2	0.4

Table-2: Antibiotic susceptibility pattern of isolated organisms

Antibiotics	<i>E. coli</i> (334 strains)		<i>Klebsiella</i> species (66 strains)		Non lactose fermenter (19 strains)		Coagulase negative <i>Staphylococci</i> (11 strains)		<i>Enterococcus</i> species (11 strains)		<i>Pseudomonas</i> species (16 strains)		<i>Proteus</i> species (2 strains)	
	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)
Tetracycline	37(26.6)	102(73.3)	5(35.7)	9(64.3)	NT*	NT	6(35.3)	11(64.7)	NT	NT	1(16.6)	5(83.3)	1(50.0)	1(50.0)
Norfloxacin	71(28.5)	178(71.4)	27(49.1)	28(50.9)	6(33.3)	12(66.6)	1(9.1)	10(90.9)	4(40.0)	6(60.0)	8(72.3)	3(27.3.0)	NT	NT
Gentamycin	121(69.5)	53(30.4)	33(76.7)	10(23.2)	11(78.5)	3(21.4)	7(38.9)	11(61.1)	2(25.0)	6(75.0)	NT	NT	1(50.0)	1(50.0)
Cotrimoxazole	75(38.6)	119(61.3)	26(65.5)	22(47.8)	2(16.6)	10(83.3)	5(33.3)	2(66.6)	1(50.0)	1(50.0)	0(0.0)	1(100.0)	NT	NT
Ciprofloxacin	60(29.5)	143(70.4)	28(60.8)	18(39.1)	7(58.3)	5(41.6)	4(44.4)	5(55.5)	1(14.3)	6(87.7)	4(50.0)	NT	2(100.0)	0(0.0)
Cefotaxime	10(50.0)	10(50.0)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Nitrofurantoin	NT	NT	4(66.6)	2(33.3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Nalidixic acid	NT	NT	NT	NT	3(17.6)	14(82.3)	1(9.1)	10(90.9)	1(33.3)	2(66.6)	4(40.0)	6(60.0)	1(50.0)	1(50.0)

*NT: Not tested

