



BACTERIAL PROFILE AND ANTIBIOTIC RESISTANCE PATTERN OF URINARY TRACT INFECTIONS

Barate D. L. and Ukesh C.S.

Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola-444001 M.S., India
E-mail: dipabarate@gmail.com

ABSTRACT

Urinary tract infections remain a major medical problem occurring frequently and worldwide. Urinary tract infections are one of the most important reasons for increased morbidity and healthcare expenditure. In present study 71(67.61%) women get affected by UTI while that of men the no. is 34(32.38%) which shows that women are more prone to UTI than men. The *Escherichia coli* were found to be the predominant organism (49.52%) followed by the *Klebsiella pneumoniae* (20.95%), *Pseudomonas aeruginosa* (15.23%), *Proteus* spp. (9.52%) and *Staphylococcus aureus* (6.66%). The present study showed that most of the uropathogens were highly resistant to Ampicillin and Amoxyclav while resistance pattern to the other antibiotics vary with the organisms. It is quite serious problem that most of the uropathogens included in study showed multiple drug resistance.

KEY WORDS: multiple drug resistance, Urinary tract infections, uropathogens

INTRODUCTION

Urinary tract infection (UTI) defines a condition in which the urinary tract is infected with a pathogen causing inflammation. Infection of the urinary tract is a common, distressing and occasionally life threatening condition. The clinical features, diagnosis, treatment, complications and long term significance vary depending upon the site of infection and various factors.

UTI is one of the most common diseases, occurring from the neonate up to the geriatric age group. It also contributes the most common nosocomial infection in many hospitals and accounts for approximately 35% of all hospital acquired infections. It also responsible for increased morbidity and economic cost. Bacteria are the primary organisms that cause UTI. Among all, Gram negative bacteria are predominant and accounts for 80-85% while Gram positive for 15-20%. *Escherichia coli* is the frequent pathogen but in complicated UTI the prevalence of other antibiotic resistant organisms increases such as *Klebsiella*, *Proteus*, *Serratia*, *Enterobacter*, *Pseudomonas*, *S. aureus*, *Bacillus* etc.(Nadia *et al.*,2004).

Increasing antimicrobial resistance in bacterial pathogens is of worldwide concern. The prevalence of antimicrobial resistance in both out and hospitalized patients with UTI is increasing and can vary according to geographical and regional locations (Khan and Zaman, 2006). This is due to the fact that antibiotics are given empirically before the laboratory results of urine culture are available to ensure the appropriate therapy (Khadri, 2009). In order to treat UTI with a rational empirical therapy, it is necessary to identify the bacterial spectrum and antimicrobial susceptibilities of the uropathogens. (Shigemura *et al.*, 2005). The present study is one of the approaches to know the trends of occurrence and resistance pattern among the uropathogens in the Akola city.

MATERIALS AND METHODS

The present study includes examination of 135 samples of urine from urinary tract infected patients of various hospitals. Fresh midstream urine samples were collected in sterile containers. Each sample was inoculated on Cystein Lactose Electrolyte Deficient agar plates using a calibrated loop delivering 0.01ml of the sample. The plates were incubated at 37°C for 18-24hrs. The plates showing $>10^5$ CFU/ml were considered as significant bacteriuria as per the Kass count (Kass, 1956). Further the uropathogens were identified by their morphological and biochemical characteristics.

The antibiotic sensitivity of isolated uropathogens was tested using Muller Hinton agar by Kirby-Bauer method. The antibiotics used for the study were Ampicillin (10mcg), Amoxyclav (30mcg), Tetracycline (30mcg), Cephalexin (10mcg), Norfloxacin (10mcg), Ciprofloxacin (5mcg), Gentamycin (10mcg), Erythromycin (15mcg), Chloramphenicol (30mcg), Nalidixic acid (30mcg), Nitrofurantoin (50mcg).

RESULTS AND DISCUSSION

The 135 samples collected, 30 samples were excluded from study due to contamination and some with insignificant bacteriuria. A total of 105 samples analyzed in the study shows 71(67.61%) of women get affected by UTI while that of men the no. is 34(32.38%) which shows that women are more prone to UTI than men. The results shown in the Table 1-3 and Figure 1-3. The table 1 shows the data of age and sex wise distribution of UTI in different groups. In our study more incidences were found for age group more than 40 years. This might be due to various physiological and immunological changes occur in this age persons.

Table- 1. Age and sex wise distribution of 105 cases of UTI.

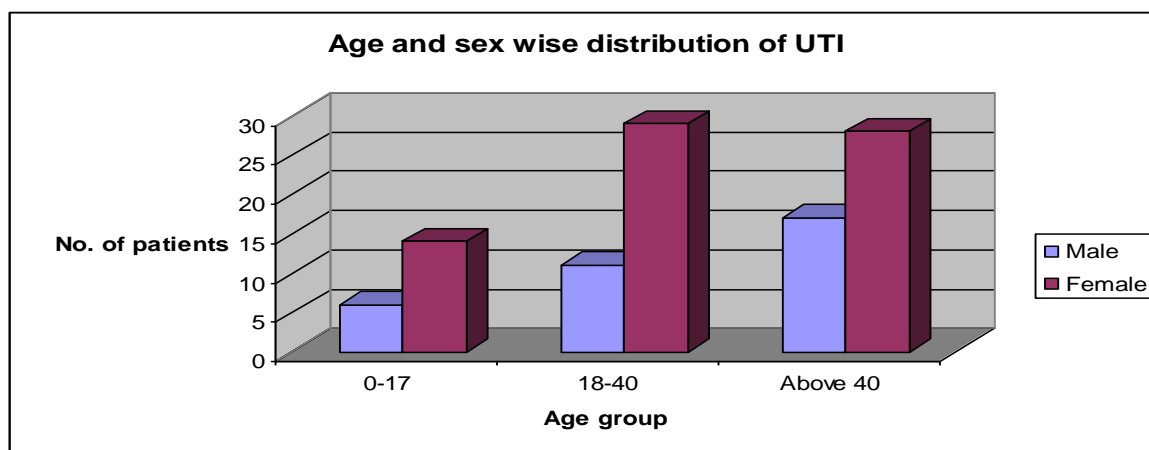
Age group (Years)	Sex		Total No. (%)
	Male (%)	Female (%)	
0-17	6(17.64)	14(19.71)	20(19.04)
18-40	11(32.35)	29(40.84)	40(38.09)
Above 40	17(50.00)	28(39.43)	45(42.85)
Total	34(100)	71(100)	105(100)

Table- 2. Organisms isolated from urine samples

Sr. No.	Name of Organism	Frequency	Percent (%)
1	<i>Escherichia coli</i>	50	49.52%
2	<i>Klebsiella pneumoniae</i>	22	20.95%
3	<i>Pseudomonas aeruginosa</i>	16	15.23%
4	<i>Proteus spp.</i>	10	9.52%
5	<i>Staphylococcus aureus</i>	07	6.66%
	Total	105	100

Table-3. Antibiotic resistance pattern among uropathogens

Antibiotics	% of isolates resistance to antibiotics				
	<i>Escherichia coli</i> (n=50)	<i>Klebsiella pneumoniae</i> (n=22)	<i>Pseudomonas aeruginosa</i> (n=16)	<i>Proteus spp.</i> (n=10)	<i>Staphylococcus aureus</i> (n=07)
Ampicillin	83.0	81.0	90.0	84.0	90.0
Amoxyclave	85.0	88.0	70.0	65.0	78.0
Tetracycline	80.0	70.0	65.0	25.0	39.0
Cephalexin	83.0	77.0	80.0	66.0	65.0
Norfloxacin	65.0	55.0	71.0	30.0	20.0
Ciprofloxacin	78.0	53.0	48.0	29.0	18.0
Gentamycin	72.0	60.0	40.0	35.0	15.0
Erythromycin	75.0	79.0	65.0	29.0	20.0
Chloramphenicol	69.0	51.0	49.0	28.0	15.0
Nalidixic acid	55.0	49.0	38.0	40.0	20.0
Nitrofurantoin	79.0	72.0	66.0	65.0	19.0

**Figure- 1.** Age and sex wise distribution of 105 cases of UTI.

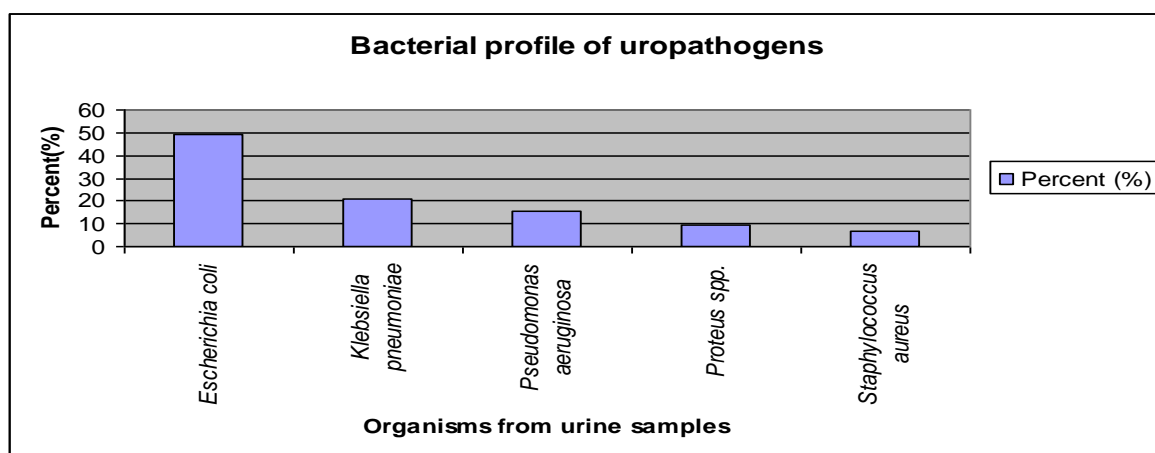


Figure-2. Bacterial profile of uropathogens.

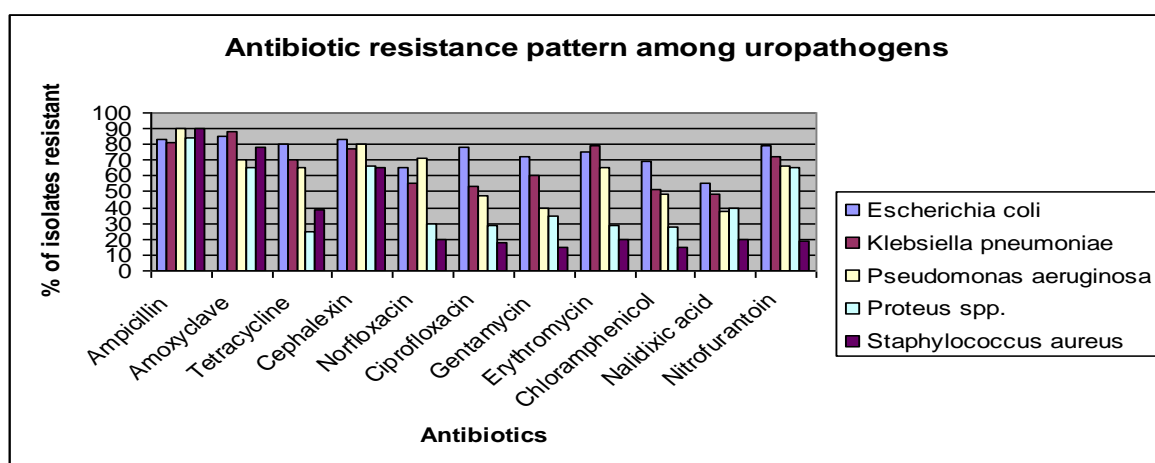


Figure-3. Antibiotic resistance pattern among uropathogens.

In our study the bacterial profile of prevalent uropathogens causing UTI also studied and is shown into table 2. The *Escherichia coli* were found to be the predominant organism (50; 49.52) followed by the *Klebsiella pneumoniae* (22; 20.95), *Pseudomonas aeruginosa* (16; 15.23), *Proteus spp.* (10; 9.52) and *Staphylococcus aureus* (07; 6.66).

The antibiotic resistance pattern amongst the isolated uropathogens were also determined and depicted in table 3. Results showed that *E coli*, *Klebsiella* and *Pseudomonas* were highly resistant to most of the antibiotics used such as Ampicillin, Amoxycylav, Tetracycline, Cephalexin, Norfloxacin, Ciprofloxacin, Gentamycin, Erythromycin, Chloramphenicol, Nalidixic acid, Nitrofurantoin. Few of the isolates of *Klebsiella pneumoniae* had less resistance to Nitrofurantoin, Norfloxacin, Ciprofloxacin and Chloramphenicol. While in some isolates of *Pseudomonas* showed less resistance towards Gentamycin, Chloramphenicol and Ciprofloxacin. Among *Proteus spp.* high resistance were found against Ampicillin, Amoxycylav, Cephalexin and Nitrofurantoin while in Gram positive *S. aureus* maximum resistance were found to Ampicillin, Amoxycylav, Cephalexin and less resistance towards other antibiotics.

DISCUSSION

Urinary tract infections are mainly due to the invasion of pathogens belonging to the family *Enterobacteriaceae* into the urethra bladder and kidneys. The prevalence of UTI is higher among women than men and was reported by various studies (Khan *et al.* 2004; Kumar *et al.* 2006). Our studies also showed higher i.e. 67% of women affected by UTI. This might be due to the anatomical predisposition.

E. coli was found to be the most predominant (49.52%) organism followed by *Klebsiella pneumoniae* (20.95%) causing UTI in our study which also in concordance with the study of Tankhiwale *et. al.* which reported *E. coli* 49.8% and *Klebsiella* 37.8%. The other organisms as *Proteus spp.* and *S. aureus* was found to be 9.52% and 6.66% respectively which also observed to be similar with other (Hussain *et al.*, 2005). Antibiotic resistance is a major clinical problem in treating infections caused by these microorganisms. The resistance to the antimicrobials has increased over the years



and the resistance rates vary from country to country (Gales, 2001). Our data demonstrated that *E. coli* and *Klebsiella* were highly resistant to Ampicillin i.e. 83% and 81% respectively. These findings are similar to the previous findings (Kahlmeter, 2003; Khadri, 2009). In this study *E. coli* were resistant to most of the antibiotics as Ampicillin, Amoxycylav, Tetracycline, Cephalexin, Gentamycin, Nalidixic acid Nitrofurantoin, ciprofloxacin, erythromycin which in concordance with other studies (Khan *et al.*, 2006; Rawat *et al.*, 2010). *Klebsiella pneumoniae* was also exceedingly resistant to Ampicillin (81%) and Amoxycylav (88%) This high resistance to these drugs also seen in other studies of Akram *et al.* (2007) and Manjunath *et al.* (2011).

Pseudomonas aeruginosa Showed different patterns of resistance than that of the other organisms more resistance was seen for Ampicillin (90%), Amoxycylav (70%), Cephalexin (80%), Norfloxacin (71%) and Nalidixic acid (72%) somewhat similar findings were reported by others (Rahman *et al.*, 2009) while in comparison isolates of *Proteus* spp. and *S. aureus* besides showing high resistance to Ampicillin, Amoxycylav, Cephalexin had less resistance to other antibiotics used.

The present study showed that most of the uropathogens were highly resistant to Ampicillin and Amoxycylav while resistance pattern to the other antibiotics vary with the organisms. It is quite serious problem that most of the organisms included in the study from UTI found resistant to multiple drugs. Antibiotic resistance has been emerged as the major problem in the uropathogenic organisms so treatment of UTI should not be advocated without urine culture and sensitivity performed. This would be helpful in proper treatment and preventing further development of resistant strains.

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