



## Prevalence and Antibiotic susceptibility pattern of Bacteria isolated from catheter Associated Urinary Tract Infection

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### Abstract

Catheter associated Urinary tract infection (CA-UTI) is the most common nosocomial infection. In the present study a total of 55 urine specimens from catheterized patients were cultured using standard loop technique. The 60 uropathogens isolated were then identified by standard, conventional methods. *Escherichia coli*, (41.6%) was the most common organisms followed by *Klebsiella pneumoniae* (21.6%) *Pseudomonas aeruginosa* (18.33%) *S. aureus* (11.6%) and *Proteus vulgaris* (6.6%). Antibiotic susceptibility was performed by Kirby Bauer method. The results showed most of the uropathogens were Multi Drug Resistant (MDR) to the tested antibiotics.

### INTRODUCTION

Urinary tract infection 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 complication and long term significance vary depending upon the sight of infection and various factors (Barate and Ukesh, 2012).

Empirical antibiotic treatment is usually started when a symptomatic catheter associated UTI is suspected and the result of urine culture is not get available. Once the catheter has been removed some patient with asymptomatic catheter associated UTI continue to have bacteria are become symptomatic (Mihankhah *et al.*, 2017; Babich *et al.*, 2017; Wazait *et al.*, 2003; Harding *et al.*, 1991; Davies & Shroff, 1983. To prevent or reduce this type of catheter related morbidity many clinical have a policy of administering a short course of prophylactic antibiotics or catheter withdrawal for all or selected groups of patients.

Increasing antimicrobial resistance among bacterial pathogens is of worldwide concern. In recent years, drug resistance to human pathogenic bacteria has been commonly reported from all over the world (Naikwade *et al.*, 2015). The prevalence of antimicrobial resistance in both out and hospitalized patient with UTI is increasing and can vary according to geographical and regional location. This is due to the fact that antibiotics are given empirically before the laboratory result of urine culture are available to ensure the appropriate therapy in order to treat UTI with rational empirical therapy (Zone and Guide, 2017). Thus it is necessary to identify the bacterial spectrum and antimicrobial susceptibility of the uropathogens (Barate and Ukesh, 2012). 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

### Collection of urine sample

Urine sample were collected from patients in different hospitals of Akola city. A total of 55 catheter urine samples were collected from patient of all the age group and both the sex who had indwelling urinary catheter. Samples were collected by puncturing the catheter tubing with a long term indwelling catheters about 2 ml urine samples were collected in a sterile urine container from catheterized patient and transported immediately to the laboratory.

### Isolation of Uropathogenic Bacteria:-

The urine samples which were collected in sterilized containers were inoculated on Hichrome UTI agar plates using a calibrated loop delivery 0.01ml of the sample. The plates were incubated at 37°C for 18-21 hrs. The pate showing  $\geq 10^5$  CFU per ml were considered as significant bacteria as per the Kass count.

### Identification of uropathogens by standard conventional method:

The isolated colonies from positive samples were then striked on different agar plates and cultures were purified. The isolates then identified on the basis of morphological, cultural and biochemical characteristics according to the Bergy's Manual of Determinative Bacteriology. The culture were then preserve at 4°C for further study.

### Determination of Antibiotic Resistance pattern of Uropathogens:-

The antimicrobial susceptibility testing was performed by Kirby Bauer disc diffusion method.

## RESULTS AND DISCUSSION

The distribution of catheter associated UTI in different age group was studied (Table 1). It was found that that highest percentage of c-UTI were found among age group 61-80 years (36.9%). It was followed by 41 - 60 years (20%), 21 -40 and 81 – 90 years (16. 3%) and least amount 1-20 years (10.9 %).

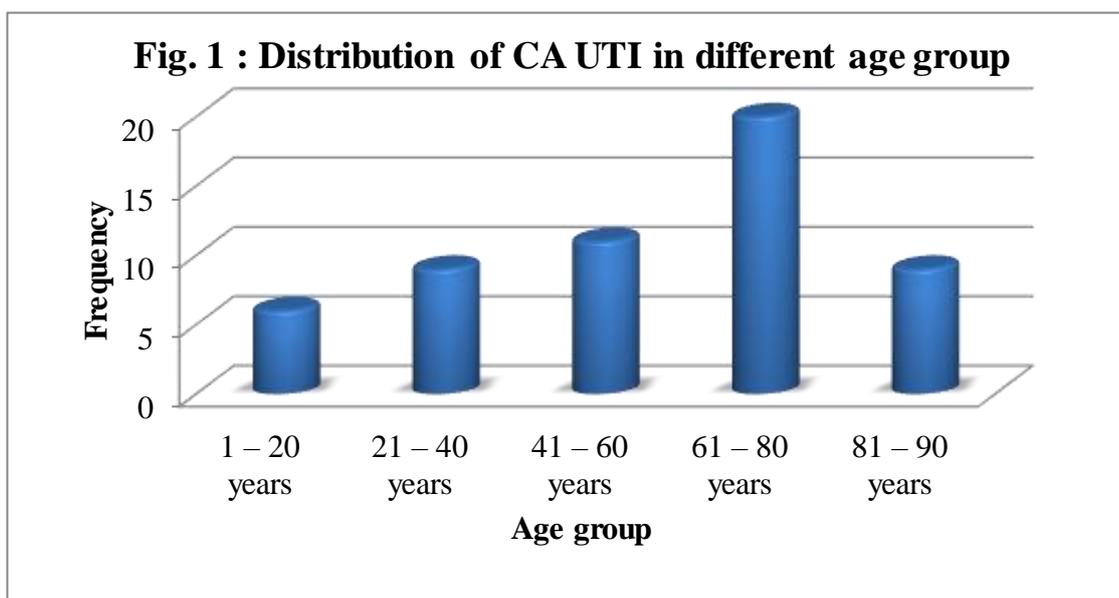
The gender wise distribution of catheter associated UTI was also determined in the present study(Fig.2). The results showed that incidence of infection were more among male which was 63.63% than female which was only 36.36 %.

The 60 uropathogens were isolated from the urine samples from catheterized patients. The uropathogens then identified on the basis of standard conventional methods. It was found that *E. coli* was the most predominant bacteria (41.6%). It was followed by *K. pneumoniae* (21.6%), *P. aeruginosa* (18.33%), *S. aureus* (11.6%) and *P. vulgaris* (6.6%).

All the isolates then subjected to the antibiotic susceptibility test. The overall antibiotic resistance and sensitivity pattern of uropathogens was evaluated which showed most of the uropathogens were resistant to the antibiotics which have been tested (Table 4). It was found that highest resistance was exhibited by uropathogens towards Ciprofloxacin (85%), Imipenem (83.3%), Ampicilin (66.6%), Chloramphenicol (66.6%), Amoxyclave (58.3%), Gentamycin (41.6%), Cefotaxime (33.3%), Tetracycline (25%), Nalidixic acid (8.33%). The antibiotic resistance showed by individual uropathogens was also determined shown in fig, 5.

**Table 1 : Distribution of Catheter Associated Urinary Tract Infection in different age group**

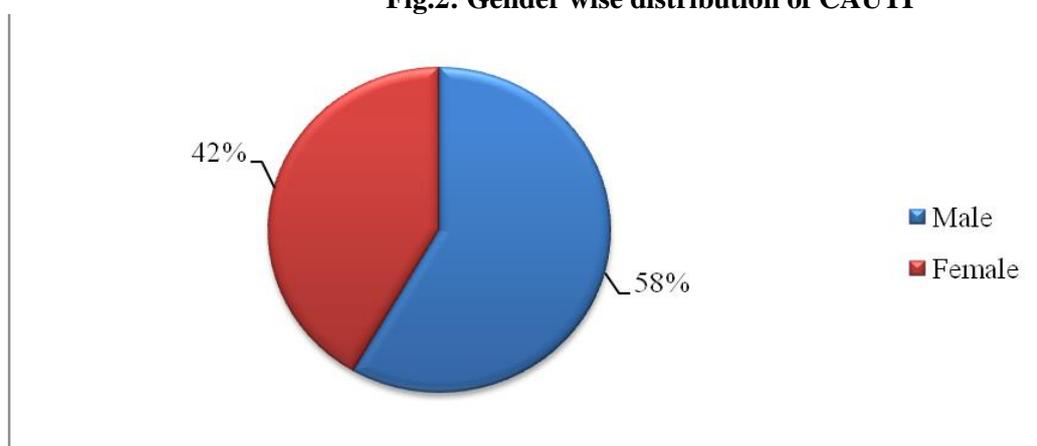
Sr. No.	Age group	Frequency	Percentage %
1	1 – 20 years	6	10.9%
2	21 – 40 years	9	16.3%
3	41 – 60 years	11	20%
4	61 – 80 years	20	36.9%
5	81 – 90 years	9	16.3%



**Table 2 : Gender wise distribution of CAUTI**

Sr. No.	Male	Percentage	Female	Percentage %
1	35	58.3%	20	41.6%

**Fig.2: Gender wise distribution of CAUTI**



**Table 3: Prevalence of CAUTI Pathogens**

Sr. No.	Name of Bacteria	No.	Percentage
1	<i>E. coli</i>	25	41.6
2	<i>K. pneumonia</i>	13	21.6%
3	<i>P. aeruginosa</i>	11	18.33 %
4	<i>S. aureus</i>	7	11.6%
5	<i>P. vulgaris</i>	4	6.6%

Fig.3: Prevalence of bacteria from CAUTI

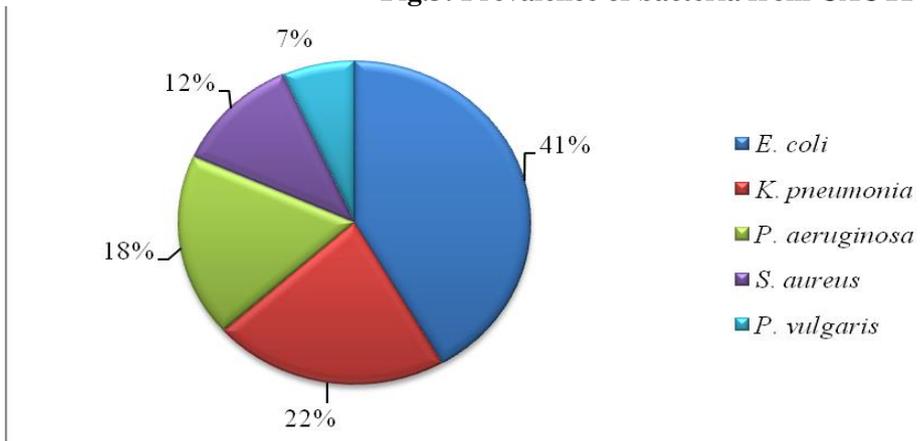
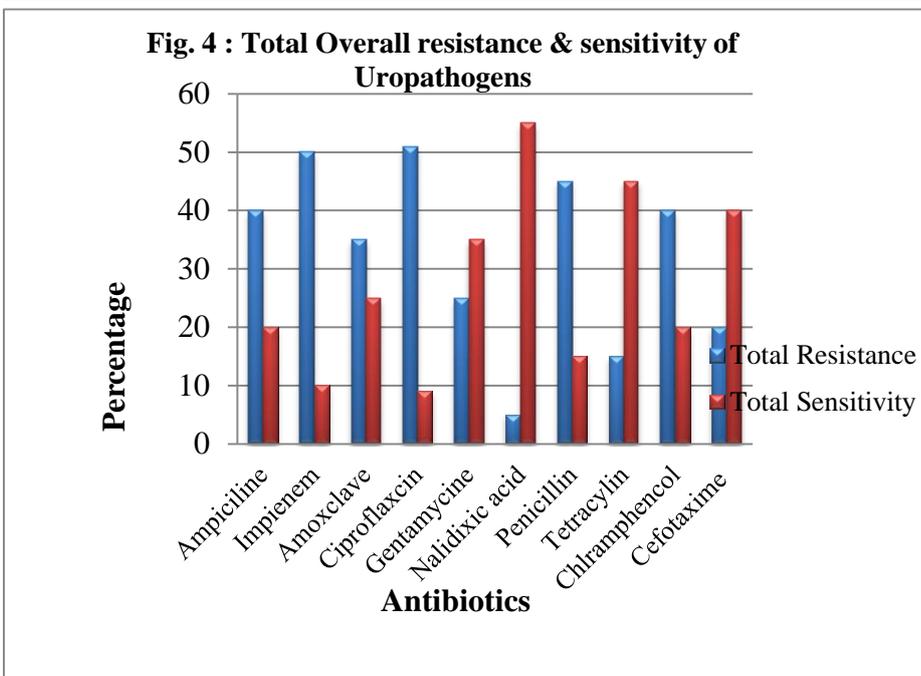
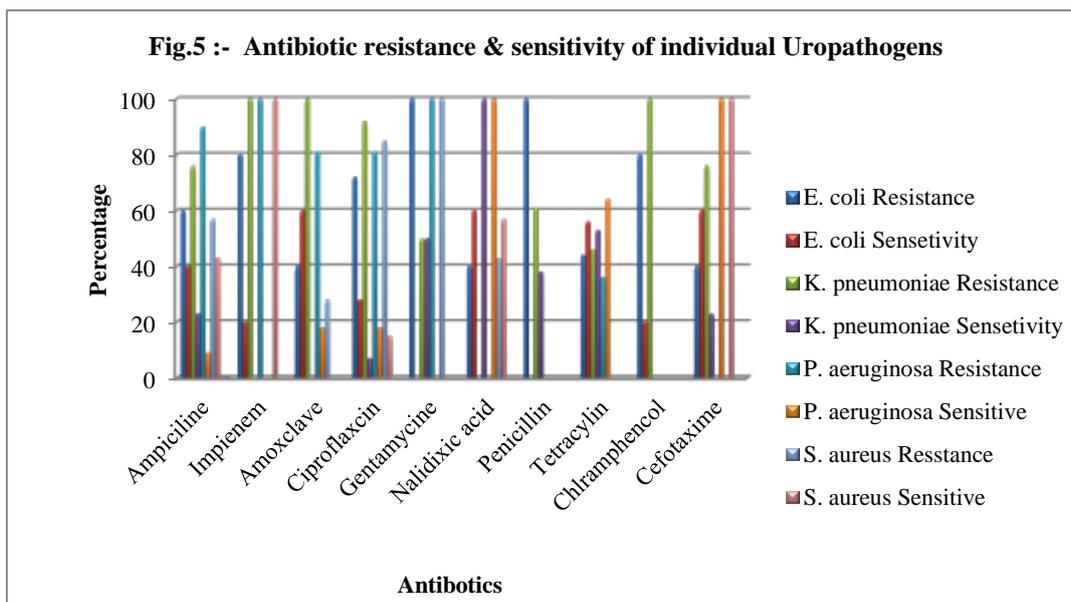


Table 4:- Total Overall resistance & sensitivity of Uropathogens

Sr. No.	Antibiotics	Total Resistance %	Total Sensitivity %
01	Ampicilin	40 (66.6%)	20 (33.3%)
02	Imipenem	50 (83.3%)	10 (16.6%)
03	Amoxyclave	35 (58.3%)	25 (41.6%)
04	Ciprofloxacin	51 (85%)	9 (50%)
05	Gentamycin	25 (41.6%)	35 (58.3%)
06	Nalidixic acid	5 (8.33%)	55 (91.6%)
07	Penicillin	45 (75%)	15 (25%)
08	Tetracylin	15 (25%)	45 (75%)
09	Chlramphenicol	40 (66.6%)	20 (33.3%)
10	Cefotaxime	20 (33.3%)	40 (66.6%)

Fig. 4 : Total Overall resistance & sensitivity of Uropathogens





**Discussion**

In the present study maximum number of catheter associated UTI patients were found to belongs to age group. 61 – 80 yrs and least UTI patients were recorded among age group 1 – 20 yrs as per (Fig. 1). This is in agreement with the results of Agarwal *et al.*, (2015), who reported maximum number of UTI patient were found 60-69 yrs of age group and least no. of UTI patient were recorded among the age group 10 -19 yrs. They reported 35% cases of UTI from Hamidia Hospital, Bhopal Madhya Pradesh India. One host factor that predisposes to catheter associated UTI is advanced age (Brumfitt *et al.*, 1961).

In our present study maximum no. of cases of Catheter Associated UTI infection were found in male than female. The prevalence of C-UTI in male was 58.3% and female 41.6%. This results are in accordance of Taiwo and Aderaunmu, (2006) who reported that the males were predominantly affected in his study than female. They reported 88.33 % C-UTI in male and 13.11 % female. But this in concordance to the study of Sabir *et al.*, (2014) who reported that the infection rate was higher in female (87.5%) patients as compared to male (71.3%).

The isolates from the catheterized samples were then identified by standard conventional methods. The results showed that amongst the predominant pathogen of Catheter Associated UTI

Bacteria, *E. coli* (41.6%) followed by *Klebsiella pneumoniae* (20.6%), *Pseudomonas aeruginosa* (16%), *S. aureus* (11%) and *Proteus vulgaris* (6 %)(Fig.3). Results of present study were supported by various researchers, Chaudhary and Parial (2015); Koshariya *et al.*, (2015); Nandani and Madhusudan (2016); Gupta *et al.*, (2016). But this is in concordance with study of Taiwo S. S., (2003) who reported that the *Klebsiella spp.* were commonest pathogen (36.6%) followed by *Pseudomonas* (27%), *E. coli* (20%), *S. aureus* (9.5%) and *Proteus*. The reported 40% cases of UTI from Ladoke Akintola University Nigeria. Researcher reported many of these pathogens are part of the patient’s endogenous bowel flora but some may have been acquired by corss-contamination from other patients or hospital personnel or by exposure to contaminated solutions or non-sterile equipment.

In the study the uropathogens which were isolated then checked for their antibiotic resistance pattern. The overall resistance pattern of uropathogens showed that highest resistance was shown by isolates to the Ciprofloxacin (85%) followed by Imipenem (83.3%) and least to the antibiotic Nalidixic acid (8.33%). This is in concordance to the results of Talwo and Aderounmu (2006) who reported 83.3% of sensitivity towards ciprofloxacin and 87.3% resistance toward nalidixic acid.

The antimicrobial susceptibility pattern confirms that most of the urinary isolates in our environment are resistant to the commonly used antibiotics. This high resistance pattern could have resulted from poorly guided antibiotic prophylaxis after catheterization and empiric therapy of catheter associated UTI. In particular, the high resistance of the Gram negative isolates to the fluoro quinolones is worrisome as these are reserve drugs for treating resistant infections. Some researchers (Threfall *et al.*, 1997; Oni *et al.*, 2001; Oni *et al.*, 2003; Livermore *et al.*, 2002; Daini *et al.*, 2005; Sangamithra *et al.*, 2017; Kazi *et al.*, 2015) have however pointed the danger of abuse of these drugs with consequent development of high resistance, the effect of which we are beginning to see in our environment.

### CONCLUSION

On the basis of results obtained it was concluded that the catheter associated UTI was more among 61-80 years of age. The catheter associated UTI was more among male than female and many uropathogens showed multi drug resistance so to prevent infection strict aseptic condition should be maintained before catheter insertion and proper precautions should be taken after removal of catheter to prevent further infection.

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