

Bacteriology of Urinary Tract Infection and Antibiotic Susceptibility Pattern at a Tertiary Care Hospital, Karimnagar

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ABSTRACT

Back ground: Urinary tract infection is one of the most common bacterial infections seen in clinical practice particularly in developing countries & is the second most common cause to visit hospitals. The causative agents for urinary tract infection vary from place to place and they also vary in their susceptibility & resistance patterns.

Objectives: Studies will help the physicians to know the most common causative agents & their susceptibility patterns to choose the antibiotic for empirical treatment. This study was done to find out the common bacteria causing UTI & to determine the antibiotic susceptibility pattern of the urinary pathogens in a tertiary care hospital at Karimnagar.

Materials and Methods: A total of 382 mid-stream urine samples from the suspected UTI patients, were tested microbiologically & antimicrobial susceptibility tests were performed for the isolated pathogens using Kirby-Bauer disc diffusion method.

Results: The Prevalence rate in males was 28.5% and in females was 28.4%. E.coli was the most frequently isolated urinary pathogen (54.1%) followed by Klebsiella (23.8%). E.coli was highly sensitive to Imipenem and Nitrofurantoin and it was highly resistant to Cefotaxime, Amoxycylv & Ceftriaxone. Klebsiella was highly sensitive to Imipenem & highly resistant to Cefotaxime.

Conclusion: Higher prevalence of UTI was seen in females in reproductive age group & in males in older age group. Gram negative organisms were the most commonly isolated organisms in UTI. Urinary pathogens showed resistance to commonly used antibiotics. The antibiotic treatment should be initiated after sensitivity testing only.

Key words: UTI (Urinary Tract Infection), antimicrobial susceptibility, urinary pathogens

INTRODUCTION

Urinary Tract Infection is one of the most important causes of morbidity, ranking next to Upper respiratory tract infection. Bacteria are the major causative organisms and account for >95% of UTIs.^[1] Organisms causing UTIs are frequently resistant to many of the antimicrobial agents, leading to recurrent UTIs, increased length of hospitalization and cost of health care.^[2]

Escherichia coli is the most frequent urinary pathogen isolated from 50-90% of all uncomplicated Urinary tract infections.^[3] The other organisms causing UTI after E.coli are Staphylococcus saprophyticus, Proteus species, Klebsiella pneumoniae, Pseudomonas aeruginosa, Enterococci and Candida albicans.^[4]

Treatment of UTI cases is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens.^[5] In spite of the availability and use of the antimicrobial drugs, UTIs caused by bacteria have been showing increasing antibiotic resistance trends in recent years.^[6]

So accurate bacteriologic records of culture results may provide guidance on empirical therapy before sensitivity patterns are available.^[7]

This study was done to find out the common bacteria causing UTI and to determine antibiotic sensitivity pattern which guides for appropriate therapy and framing

antibiotic policies for hospital.

MATERIALS AND METHODS

This study was done from June 2016 to November 2016, at the Department of Microbiology, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, Telangana, India. A total of 382 Urine samples were collected from patients with suspected UTI including all age groups & both males, females. Mid - stream urine samples were collected in sterilized containers. The samples were labelled and transported to the laboratory. The collected Urine samples were inoculated on CLED (Cysteine Lactose Electrolyte Deficient) agar plates, Nutrient agar, Mac Conkey agar, Blood agar (All media from Hi Media laboratories) and incubated aerobically at 37°C for 24 hrs.

The urine culture plates were examined for pure growth determined by morphologically same type of colonies and colony counts for determination of significant & insignificant growth. A growth of >105 colony forming units /ml was considered as significant bacteriuria.^[8]

Colony appearance was noted. Isolated colonies were subjected to preliminary tests like Gram's staining, motility by hanging drop, Catalase test & Oxidase test. These tests were followed by biochemical reactions for identification of the isolated organism according to Cheesbrough (2002, 2004, 2006). Antibiotic susceptibility tests & interpretations were carried out for bacterial isolates on Mueller-Hinton agar plates by Kirby-Bauer disc diffusion method.^[9] Commercially available HI Media antibiotic discs were used. Antibiotics used were Nitrofurantoin, Ciprofloxacin, Amoxycylav, Imipenem, Piperacillin/Tazobactam, Amikacin, Gentamycin, Cefotaxime, Ceftriaxone, Vancomycin & Linezolid.

RESULTS

A total of 382 samples were collected during the study period June 2016 to November 2016 of which 193 were from males and the rest 189 samples were from females. Pathogenic bacteria were isolated in 109 samples of which males were 55 and females were 54. In our study the prevalence rate was 28.53%. In males the prevalence rate was 28.5% and prevalence rate in females was 28.4%. The prevalence pattern in males & females shown in Table 1.

TABLE 1: Sex wise distribution of UTI

Sex	Total No. of samples	No. of positive samples	Prevalence (%)
Male	193	55	28.5%
Female	189	54	28.4%
Total	382	109	28.5%

UTI was most commonly seen in the age group of 21-40

years as 36.6 % of positive samples were in this age group. The age wise distribution of UTI shown in Table 2. Among females UTI was commonly seen in the age group of 21-40 years 25/54 (46.2%) and in males it was common in older age group >60 years 20/55 (36.3%).

Escherichia coli was the most frequently isolated urinary pathogen 59 (54.1%) followed by Klebsiella 26(23.8%), Proteus species 7(6.4%), Pseudomonas 4(3.6%), Acinetobacter 1(0.9%), S.saprophyticus 8 (7.3%), S.epidermidis 3 (2.7%) & S.aureus 1 (0.9%). The isolation rates are shown in table 3.

TABLE 2: Age wise distribution of UTI

Age in years	Males	Females	Total
5-20	5	11	16
21-40	15	25	40
41-60	15	11	26
>60	20	7	27

TABLE 3: Pathogens isolated from UTI

Urinary pathogen isolated	Number	%
Gram Negative bacilli	97	88.9
Escherichia coli	59	54.1
Klebsiella	26	23.8
Proteus	7	6.4
Pseudomonas aeruginosa	4	3.6
Acinetobacter	1	0.9
Gram Positive cocci	12	11
Staphylococcus saprophyticus	8	7.3
Staphylococcus epidermidis	3	2.7
Staphylococcus aureus	1	0.9
Total	109	100

E.coli was highly sensitive to Imipenem, Nitrofurantoin and it was highly resistant to Cefotaxime, Amoxycylav. Klebsiella highly sensitive to Imipenem, Gentamycin, Nitrofurantoin and highly resistant to Cefotaxime, Amoxycylav. The sensitivity pattern of frequently isolated urinary pathogens to antibiotics shown in Table No.4.

DISCUSSION

Effective management of patients suffering from bacterial UTIs commonly relies on the identification of the type of organisms that caused the disease and the selection of an effective antibiotic agent to the organism. Diagnosis of UTI is a good example of the need for close cooperation between the clinician and microbiologist.

In our study the Prevalence of isolation of urinary pathogens was 28.53%. The Prevalence of UTIs was

TABLE 4: Percentage of Antibiotic sensitivity pattern of frequently isolated urinary pathogens

Antibiotics	E.coli (%)	Klebsiella (%)	S.saprophyticus(%)
Nitrofurantoin	74.5	42.3	50
Amoxyclav	6.7	3.8	12.5
Piperacillin/Tazobactam	53.8	53.8	50
Ceftriaxone	13.5	15.4	12.5
Cefotaxime	6.7	26.9	12.5
Amikacin	44	61.5	37.5
Gentamycin	67.7	65.4	25
Ciprofloxacin	32.2	46	37.5
Imipenem	83	92.3	-
Vancomycin	-	-	25
Linezolid	-	-	37.5

almost same in both males 55(28.5%) and females 54(28.4%). But higher proportion of patients were in age group of 21-40 years in females and older age group >60years in males. This was in consistent with a study done by Beyene G et al^[10] and Susan AMK^[11] who concluded that most uncomplicated UTIs occur in women who are sexually active, with far fewer cases occurring in older women, pregnant and in men. The incidence of UTI increases in males as the age advances because probably due to prostate enlargement & other related problems of old age.

E.coli (54.1%) was the most common isolated organism in our study. This was seen in other studies done by Gupta et al.^[12] Moges et al^[13] Sibi et al^[14] The second most common isolated pathogen was Klebsiella in our study accounting for 23.8%. This was seen in other studies done by Khameneh et al^[15] and Chin et al.^[16]

In our study E.coli was most resistant to Cefotaxime, Amoxyclav and Ceftriaxone. It was highly sensitive to Imipenem and Nitrofurantoin. Antimicrobial resistance is a natural biological response of microbes to antimicrobial drugs. Resistance may be inherent.^[17]

In our study the susceptibility pattern of E.coli was Imipenem>Nitrofurantoin > Gentamycin >Piperacillin-Tazobactam>Amikacin. The susceptibility pattern of Klebsiella was Imipenem>Gentamycin>Amikacin.

All the most frequently isolated organisms showed resistance to commonly used antibiotics like Ciprofloxacin, Amoxyclav and cephalosporins.

CONCLUSION

The prevalence of UTI was almost same in both males and females. In females UTI was seen in patients between

21-40 years age group & in males it was seen in older age >60 years. Gram negative organisms were the most commonly isolated organisms in UTI among which E.coli was the most frequent causative agent. Urinary pathogens showed resistance to commonly used antibiotics like Ciprofloxacin, Amoxyclav and Cephalosporins. The susceptibility and resistance patterns of urinary pathogens should be considered before starting empirical treatment for UTI. Development of resistance to commonly used antibiotics for treating UTI alert us against indiscriminate usage of antibiotics to prevent development of resistance against an antibiotic.

CONFLICT OF INTEREST :

The authors declared no conflict of interest.

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