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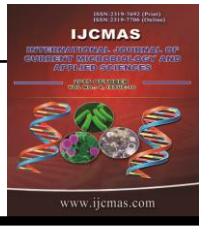

Original Research Article

Isolation, identification and antimicrobial susceptibility pattern of uropathogens isolated at a tertiary care centre

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Keywords

UTI; Animicrobial susceptibility; Kirby-Bauer disc diffusion method; Uropathogens

A B S T R A C T

Urinary tract infection (UTI) is one of the most common infections occurring in the hospital. The organisms causing UTI vary from place to place and time to time. The aim of present study was to analyse the prevalence and antimicrobial sensitivity pattern of various pathogens causing UTI. It is a retrospective study carried out from January – June 2015 at Al-Ameen Medical College, Vijaypur, Karnataka, a tertiary health care centre. A total of 564 urine samples from clinically suspected UTI cases were examined by semiquantitative culture method. The antimicrobial sensitivity pattern of these urinary isolates was studied by Kirby-Bauer disc diffusion method. Out of 574 urine samples, 220 were culture positive and 354 showed insignificant or no growth. Isolation rate was 39.7% with *Escherichia coli* 85 (38.6%) being most common followed by *Klebsiella pneumoniae* 54 (24.6%) *Pseudomonas aeruginosa* 34 (15.5%) and *Staphylococcus aureus* 28 (12.7%). Incidence as well as culture positivity was more in females 132 (60.0%) compared to males 88 (40.0%). Isolation rate was more in the age group of 21-30 years in females. The antimicrobial sensitivity pattern showed maximum sensitivity to Imipenem (80.1%) followed by Piperacillin+tazobactum (60.3%), Gentamicin (40.5%), Cefuroxime (38.7%), Netilmicin sulfate (38.2%), Nitrofurantoin (34.2%) and cefotaxime (32.8%). Maximum resistance was seen to Ampicillin followed by Nalidixic acid. Gram negative organisms are most commonly isolated organisms in urine samples of suspected cases of urinary tract infections. Culture and sensitivity of the isolates from urinary samples should be done as a routine before advocating therapy for better therapeutic outcome.

Introduction

Urinary tract infections (UTI's) are among the most common bacterial infection that lead patients to seek medical care. They are the most common bacterial acquired infections accounting for 35% of nosocomial infections. UTI's are important complications of diabetes, renal diseases, renal transplantations and structural and

neurological abnormalities that interfere with urine output.

Despite widespread availability of antibiotics, treatment of UTI is still difficult due to antibiotic resistance in uropathogens. Antibiotic resistance in uropathogens is due to frequent misuse of antibiotics. Antibiotics are prescribed even before results of urine culture are available. Since pattern of antibiotic resistance among uropathogens vary even over a short periods and depend on site of isolation in different environments, periodic evaluation of antimicrobial susceptibility pattern of uropathogens is needed to update the information. The present study aim to know most common bacterial cause for UTI and their antimicrobial susceptibility pattern.

Materials and Methods

It is a retrospective study undertaken from January – June 2015 in Al Ameen Medical College, H&RC, Vijaypur, Karnataka. The study protocol was approved by Institutional Ethical Committee of Al-Ameen Medical College, H&RC. A total of 222 culture proven urine isolates were studied. Samples were collected from both in-patient as well as outpatient departments. Majority of samples were clean catch midstream urine specimens, others included catheterized urine specimen and suprapubic aspirates.

Culture was done by calibrated loop technique. A calibrated loop which delivers 0.01 ml of specimen was used to detect lower number of organisms in certain specimens. It was plated on Cysteine Lactose Electrolyte Deficient (CLED) agar. The plates were incubated at 37^0C overnight. For Gram negative bacilli more than 10^5 colonies per ml of urine, for Gram positive 10^3-10^5 colonies per ml was considered significant. Isolates were identified by colony morphology, Gram reaction and various biochemical tests. Re-incubation of negative cultures for another 24 hours was done and reported at the end of 48 hours of incubation. Kirby-Bauer disc diffusion method was used to assess antimicrobial sensitivity of isolated pathogens. Different antibiotics included ampicillin (10 µg), nalidixic acid (30 µg), norfloxacin(10 µg), ciprofloxacin(5 µg), nitrofurantoin, (300 µg), gentamicin (10 µg), netilmicin sulfate (30 µg), cefuroxime(30 µg), cefotaxime(30 µg), chloramphenicol(30 µg) piperacillin+tazobactum (100/10 µg), imipenem (10 µg) were used to test sensitivity.

Results and Discussion

Out of 574 urine samples, 220 were culture positive and 354 showed insignificant or no growth. Isolation rate was 39.7% with Escherichia coli 85 (38.6%) being most common followed by Klebsiella pneumoniae 54 (24.6%) Pseudomonas aeruginosa 34 (15.5%) and *Staphylococcus aureus* 28 (12.7%) as shown in Table 1 below:

Incidence as well as culture positivity was more in females 132 (60.0%) compared to males 88 (40.0%). Isolation rate was more in the age group of 21-30 years in females as shown in Figure 1 below:

The antimicrobial sensitivity pattern showed maximum sensitivity to Imipenem (80.1%) followed by Piperacillin+tazobactum (60.3%), Gentamicin (40.5%), Cefuroxime (38.7%), Netilmicin sulfate (38.2%), Nitrofurantoin (34.2%) and cefotaxime (32.8%). Maximum resistance was seen to Ampicillin followed by Nalidixic acid as shown in Table 2 below:

The urinary infection can involve any part of the genital tract from urethra to renal parenchyma. The underlying cause of this infection is the retrograde ascent of perineal

flora through the urethra. It especially affects the females because of the shorter and wider urethra. Regional monitoring of the causative bacteria and their susceptibility patterns provides the clinician with data that determines the selection of empirical treatment.

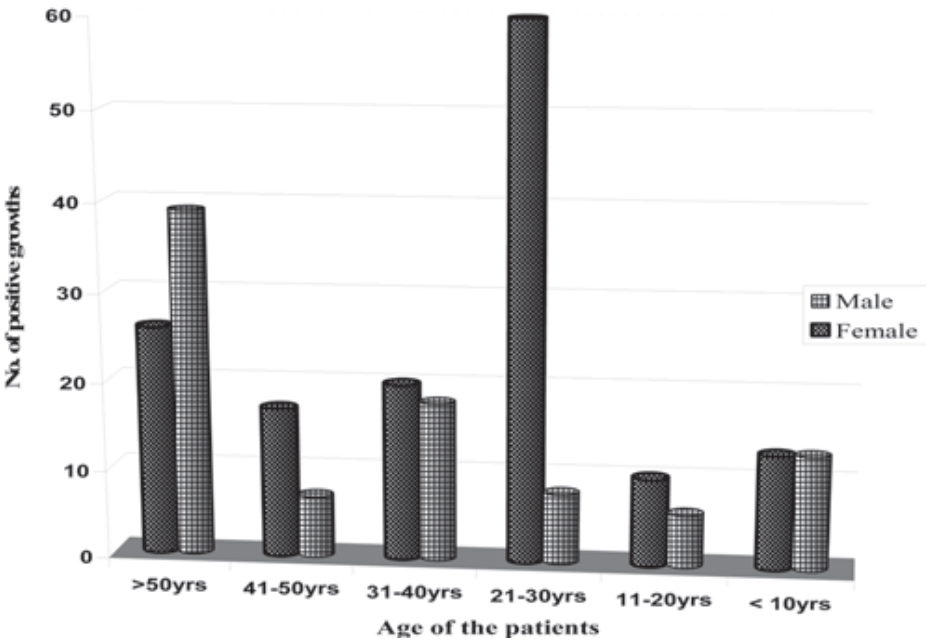
Table.1 Bacteria isolated from UTI cases

Organisms	Total isolates (N=220)
Eshcherichia coli	85 (38.6%)
Klebsiella pneumoniae	54 (24.6%)
Pseudomonas aeruginosa	34 (15.5%)
Staphylococcus aureus	28 (12.7%)

Table.2 Antibiotic sensitivity pattern of uropathogens

Antibiotics	Isolates tested	Sensitive	Intermediate	Resistant
Imipenem	220	216 (98.2%)	02 (0.9%)	02 (0.9%)
Piperacillin+tazobactum	220	208 (94.5%)	03 (1.4%)	09 (4.1%)
Gentamicin	220	182 (82.7%)	04 (1.8%)	14 (6.4%)
Cefuroxime	220	173 (78.6%)	07 (3.2%)	40 (18.2%)
Netilmicin sulfate	220	187 (85.0%)	03 (1.4%)	30 (13.6%)
Nitrofurantoin	220	166 (75.5%)	04 (1.8%)	50 (22.7%)
cefotaxime	220	192 (87.3%)	06 (2.7%)	22 (10.0%)
Ampicillin	220	02 (0.9%)	Nil	218 (99.1%)
Nalidixic acid	220	02 (0.9%)	01 (0.5%)	217 (98.6%)

Fig.1 Age distribution among the growth positive cases



Mostly UTIs are bacterial in nature and require broad spectrum antibiotic treatment. The Choice of antibiotics are Floroquinolones, cephalosporins and aminoglycosides. Cephalosporins including cephradine, cefaclor, cefotaxime and ceftazidime act as inhibitor of cell wall and are used frequently for treatment for gram negative infection. The mechanism of action of Floroquinolones including ciprofloxacin, ofloxacin, enoxacin and sparfloxacin is to inhibit the activity of essential enzymes (DNA gyrase and topoisomerase) for the DNA replication. The aminoglycosides act by inhibiting the bacterial protein synthesis. The selection of antimicrobials for treatment should not be arbitary but on knowledge of regional data on microbial isolates and their sensitivity to antibiotic. Based on these data regional empirical therapy is recommended for effective control of infection. We found that *E. coli* showed maximum resistance to Ampicillin (99.1%) and nalidixic acid (98.6%). Other uropathogens isolated also showed high resistance to ampicillin and nalidixic acid. All the uropathogens isolated in our study showed high sensitivity to imipenem, piperacillin+ tazobactum, cefotaxime, netilmicin sulfate, gentamicin, cefuroxime and nitrofurantoin. These findings are similar to previous studies. The best response against these bacteria was observed with cefotaxime, nitrofurantoin and gentamicin, that corresponds to regional and international findings. Resistance to ampicillin, and nalidixic acid has increased significantly all over the world11. At the same time susceptibility to cefotaxime, piperacillin+tazobactum and imipenem is seen in our region and so are the most effective treatment in UTI. The reason for the low resistance in these antibiotics may be due to their relative expense and because they are not easily available. Thus, these drugs could be considered as alternative options in empirical treatment of UTIs. Since *E. coli* is the most commonly cultured isolate, its susceptibility should be considered foremost. The most effective antibiotic against *E. coli* is nitrofurantoin in comparison to other commonly used antibiotics such as ampicillin. Therefore nitrofurantoin should be the first line of treatment in UTI. It is imperative that indiscriminate use of these and all other antibiotics is stopped at all levels so that resistance does not increase and the choice of available and effective antibiotics is not limited.

In conclusion, Gram negative organisms are most commonly isolated organisms in urine samples of suspected cases of urinary tract infections. Culture and sensitivity of the isolates from urinary samples should be done as a routine before advocating therapv for better therapeutic outcome.

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