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A Study of Bacterial Uropathogens and their Antibiotic Sensitivity Pattern in a Tertiary Care Centre

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A B S T R A C T

Urinary tract infection (UTI) is one of the most common infection seen in clinical practice in all age groups. The UTI is most commonly caused by *E.coli*. There is emergence of multidrug resistant bacteria because of inadvertent use of antibiotics in treating these infections. The changing trend of pathogens and their antibiotic sensitivity the study has been undertaken, to determine the bacteria causing the UTI and find their antibiotic sensitivity. A total of 200 urine specimens showing the significant bacteriuria are studied. The midstream urine samples collected in a sterile container. The semi quantitaative analysis done to know the bacterial count. The organism is identified using Gram staining and standard biochemical tests. The antibiotic sensitivity is done using 0.5% turbidity on Mueller-Hinton agar and results are interpreted following CLSI guidelines. UTI is most commonly seen in females and in age group ranging from 50yrs and above. The pregnancy and diabetes found to be major contributing risk factors apart from catheterised patients in hospital setup. *E.coli* is the most common bacteria causing the UTI followed by *Klebsiella*, *Enterococcus*, *Pseudomonas*, *Staphylococcus aureus*, *Citrobacter*, *Proteus* and CONS species. The Nitrofurantoin and flouroquinolones are found to be sensitive in 80% of cases. The Carbapenems found to be 95% sensitive in gram negative bacteria and Vancomycin was 100% sensitive in gram positive bacteria. Females and people aged 21-30yrs are most commonly affected. *E.coli* is still the most common bacteria causing UTI. The varying resistance patterns alarms strict follow of antibiotic policy and mandatory bacterial culture in all UTI patients.

Introduction

About 150 million cases of urinary tract infections occur worldwide annually[1].

UTI has been most common disease encountered all groups from neonates to old age and in both sexes. UTI if untreated in old age may lead to bacteremia, septic shock, respiratory distress syndrome and death[2]. *E.coli* is the most common pathogen causing the UTI accounting for around 80% of the total cases[3].UTI is most common type of nosocomial infection accounting for 44% of

cases[4]. The antimicrobial therapy has been widely used in management of UTIs. The emergence of antimicrobial resistance is major concern in current antibiotic therapies as several studies have reported multidrug resistance among the isolates[5]. Diabetes, chronic renal disease and catheterization were important risk factors associated with UTI[6].

Materials and Methods

The study was conducted in Basavaeshwara teaching and general hospital, a tertiary care hospital attached to M.R. medical college at Kalaburagi, Karnataka, India. The study constituted 200 patients with UTI showing significant growth of pathogen in urine. Freshly voided, clean-catch midstream urine was collected from each patient into sterile screw-capped universal container. The specimen was labeled and transported to the microbiology laboratory for processing within 2h.

Semi quantitative urine culture was done using a calibrated loop. A loopful (0.001mL) of well mixed un-centrifuged urine was inoculated on to the surface of MacConkey and blood agar. Allplates were then inoculated at 37° Caerobically for 24h. A significant growth is considered if the number of colony is>105 CFU/ml of urine. The bacterial colony is further processed by Gram stain and relevant biochemical tests for species identification. Antimicrobial sensitivity testing done using Kirby-Bauer Disc diffusion method on Muller-Hinton agar and results interpreted following the criteria of Clinical and LaboratoryStandardsInstitute[7].

Results and Discussion

Of the 200 patients studied 126(63%) were females and 74(37%) were males. The most common age group found to be 21-30 years, mainly in females with total of 25% of cases
The most common causative bacteria is found to be *E.coli* in 98(49%) of cases followed by *Klebsiella* species 27(13.5%), *Enterococcus* species 23(12.5%), *Pseudomonas* species 15(7.5%), *Staphylococcus aureus* 12(6%), *Proteus* species 10(5%), *Citrobacter* species 9(4.5%) & CONS in 6(3%) of the total cases. Overall around 80% of cases were due to Gram negative bacteria.

The Diabetes mellitus was the commonly found risk factor in 48(24%) of cases followed by pregnancy 29(14.5%), catheterisation in 23(12.5%), chronic renal disease in 12(6%) of the cases (Table 1–4).

Table.1

Age group	Females	Males
1-10	12	07
11-20	17	06
21-30	38	12
31-40	09	13
41-50	16	09
51-60	13	11
61 & above	21	17
	126(63%)	74(37%)

Table.2

Causative agents	No of cases	Percentage
Escherichia coli	98	49%
Klebsiellasp	27	13.5%
Enterococcus sp	23	12.5%
Pseudomonas sp	15	7.5%
Staphylococcus aureus	12	6%
Proteus sp	10	5%
Citrobacter sp	09	4.5%
CONS	06	3%
Total	200	

Table.3

Risk factors	No of cases associated	Percentage
Diabetes	48	24%
Pregnancy	29	14.5%
Catheterization	23	12.5%
Chronic renal disease	12	6%
	112	56%

Table.4

Organism and Resistance	Amoxicilli	Amox/Cla	Amikacin	Norfloxaci	Ciprofloxa	Cefuroxim	Cefepime	Imipenem	Vancomyc	Nitrofuran	Piperacilli	cotrimoxa
Escherichia coli	96%	84%	54%	67%	71%	46%	33%	02%	-	21%	45%	84%
Klebsiella sp	98%	92%	65%	72%	72%	53%	42%	02%	-	32%	53%	92%
Enterococcus sp	88%	84%	-	92%	92%	84%	76%	-	00%	36%	56%	-
Pseudomonas sp	100%	93%	80%	86%	86%	77%	63%	16%	-	42%	77%	100%
Staphylococcus aureus	98%	82%	58%	64%	64%	48%	26%	00%	00%	18%	58%	82%
Proteus sp	96%	84%	65%	65%	65%	42%	32%	00%	-	24%	42%	84%
Citrobacter sp	96%	84%	54%	64%	72%	48%	32%	00%	-	32%	42%	92%
CONS	66%	66%	33%	66%	66%	66%	33%	00%	00%	00%	66%	100%

The antibiotic sensitivity testing showed varied resistance of bacteria to different antibiotics. However imipenem was the most sensitive antibiotic followed by Nitrofurantoin, cefepime & piperacillintazobactum for gram negative

bacteria. Vancomycin followed by imipenem, cefepime and nitrofuranto in were best for gram positive bacteria.

UTI is the most common infection seen in all ages and both sexes. The present study constituted 200 patients with symptoms of active urinary tract infection. The results showed females were more affected than males in a ratio of 1.5:1. Females were affected more due to shorter urethra and close proximity of the urethra to perianal region. Akram et al also found that females were affected more[8].Most common age group found to be 21-30 years with 25% of cases. This was mainly due to pregnancy being the risk factor in this age group.

The *E.coli* is still the most common bacteria, however there is rise in incidence of other type of bacteria. This is similar to study done by Gupta V[9]. This is due to *E.coli* from perianal region getting access to urinary tract. Diabetes promotes the growth of colonisation and hence UTI most common in those patients. Also reduced immunity in diabetes enhances the risk of UTI[10].

Catheterisation was found in 12.5% of cases. The pathogens showed varied resistance indicating mandatory bacterial culture and sensitivity testing of all suspected cases so to prevent further development of resistance. Vancomycin and Imipenem were best antibiotics in their groups and these can be used only in complicated cases with septicaemia.

Nitrofurantoin found to be one of the best drug with high sensitivity for gram negative as well as gram positive bacteria, however it has limited role in upper UTI with systemic involvement[11].

In conclusion, the UTI is most commonly seen in females mainly of age group 21-30. Diabetes and pregnancy are the most common risk factors found apart from catheterisation. *E.coli* is still the most common pathogen found followed by Klebsiella, Enterococcus & Pseudomonas. Gram negative bacteria accounted for 75% of total cases. There is increased incidence of resistance to penicillins, fluoroquinolones & also cephalosporins. Nitrofurantoin is the one of the most sensitive drug to gram negative and gram positives. The increased antibiotic resistance mandates the culture & sensitivity in every case and strict antibiotic policy for treating the urinary tract infections.

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