Original Research Paper

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MICROBIOLOGY

ANTIBIOTIC RESISTANCE PATTERN IN UROPATHOGENS IN A TERTIARY CARE HOSPITAL

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KEYWORDS :

INTRODUCTION

Urinary tract infection (UTI) remains one of the most common bacterial infections and second most common infectious disease in community practice (first being respiratory infections). It accounts for one million hospitalizations annually [1].UTI if diagnosed early and with adequate antibiotic coverage is not alarming. However, if inadequately treated, can cause significant morbidity and mortality .[1] UTI continues to be the commonest nosocomial infection accounting for approximately 40% of all hospital acquired infections.

Asymptomatic bacteriuria is isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen obtained from a person without symptoms or signs of urinary infection.

AIM AND OBJECTIVES

- Aim of the study is to isolate bacteria that cause urinary tract infections (UTI).
- To understand resistance pattern of uropathogens which assist in choosing empirical therapy for urinary tract infections (UTI).

MATERIALS AND METHODS

The present study was conducted on patients with clinically suspected UTI attending to S.V.R.R.G.G.Hospital, Tirupati. 500 urine samples were collected from these patients and were tested.

Both male and female patients were included in the study. Patients who had clinically suspected UTI were asked to collect a fresh sample of mid stream urine into a sterile container after cleaning the genitals . The sample was transported to the laboratory within one-two hours and processed.

INCLUSION CRITERIA

- Both male and female patients having clinically suspected UTI were included in the study. Clinical diagnostic criteria include dysuria, frequency, urgency and fever.

EXCLUSION CRITERIA

- Patients on long term antibiotic therapy prior to or during the investigation.

RESULTS

The present study was done in the Department of Microbiology, S.V.Medical College, Tirupati. 160 isolates of uropathogens isolated from 500 clinical samples from different wards & different age groups of patients admitted in S.V.R.R.G.G. Hospital, Tirupati, were included in this study.

All 160 isolates were tested for antibiotic sensitivity by disc diffusion method.

ORGANISMS ISOLATED	NUMBER	PERCENTAGE (%)
Escherichia coli	67	41.87
Klebsiella spp	54	33.75
Coagulase negative Staphylococcus	10	6.25
Candida spp	8	5
Pseudomonas spp	6	3.75
Enterococcus spp	5	3.12
Acinetobacter spp	5	3.12
Staphylococcus aureus	4	2.5
Enterobacter spp	1	3.12
TOTAL	160	32

Table.1. Frequency of uropathogens in UTI

Among 160 isolates major bacterial isolate from UTI was Escherichiae coli and the second most common organism was Klebsiellae spp followed by CONS, Candida spp, Pseudomonas spp, Enterococcus spp, Acinetobacter spp, Staphylococcus aureus and Enterobacter.

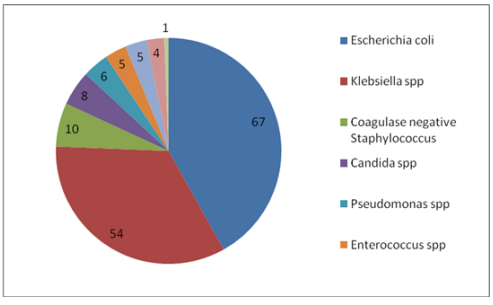

Fig. 1. Frequency of uropathogens in UTI

	TOTAL CASES (500)	CULTURE POSITIVE CASES(160)
MALE	157(31.4%)	41(25.62%)
FEMALE	343(68.6%)	119(74.37%)

Table .2. Sex wise distribution of UTI

25.62% of organisms were isolated from male patients and 74.37% were isolated from female patients. This showed a female predominance.

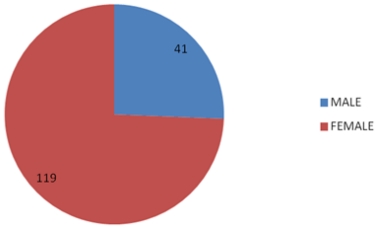

Fig. 2. Sex distribution among culture positive cases

AGE GROUP (yrs)	MALE	POSITIVE MALES	FEMALE	POSITIVE FEMALES	TOTAL POSITIVE CASES
1-10	86	23	52	15	38(23.75%)
11-20	21	7	46	18	25(15.62%)
21-30	11	11	144	42	53(33.12%)
31-40	15	4	46	14	18(11.25%)
41-50	6	4	26	5	9(5.62%)
51-60	9	2	14	4	6(3.75%)
61-75	6	3	13	4	7(4.37%)
>75	3	3	2	1	4(2.5%)

Table . 3. Age wise distribution of UTI

Age group between 21-30 showed highest incidence of UTI followed by 1-10, 11-20, 31-40, 41-50, 61-75, 51-60 and ≥75. This showed that more incidence of UTI among sexually active population.

Table .4. Antibiotic resistance pattern of uropathogens (%)

Name of Antibiotic	ESCH. COLI N=67	KLEBS IELLA SPP.N=54	CONS N=10	PSEUDO MONAS SPPN=6	ENTERO COCCUS N=5	ACINETO BACTER N=5	STAPHYLOCO CCUSAUREUS N=4	ENTERO BACT ER
AK	20	39	100	33	80	20	0	S
LE	36	23	50	67	60	20	25	S
CAZ	94	95	80	100	100	100	50	R
CIP	73	81		83	100	80	100	R
CTR	76	76	60	83	40	60	25	R
NIT	28	44	30	83	80	20	25	S
COT	79	70	80	100	80	60	75	R
AMC	75	85	80	100	100	100	100	R
NA	90	93		100	80		100	R
P/T	12	52	0	33	40	20	25	S
IMP	2.98	17	0	50	40		0	S
P					100		100	
OX			100				100	
VA			0		40		0	
CB				83				

- AK-amikacin, LE-levofloxacin, CAZ-ceftazidime, CIP-ciprofloxacin,
- CTR-ceftriaxone, NIT-nitrofurantoin, COT-cotrimoxazole, AMC-amoxyclav,
- NA-nalidixic acid, P/T-piperacillin/tazobactam, IMP-Imipenem,
- P-Penicillin,OX-oxacillin,VA-vancomycin, CB-carbencillin.

DISCUSSION

The aim of this study was to know the resistance pattern among uropathogens that cause symptomatic urinary tract infections (UTIs). The uropathogens identified were similar to those of many other studies in different regions, however incidence were different. The similarities and differences in the type and distribution of uropathogens may result from different environmental conditions and host factors, and practices such as healthcare and education programs, socioeconomic standards and hygiene practices in each country.

In this study UTI in women (74.37%) vastly outnumber those in men (25.62%). This correlates to the studies of Gupta et al [3], Mohammed Akram et al [4]. This is related to factors such as length of urethra, distance of urogenital meatus from anus and the antibacterial properties of prostatic fluid .21-30 years old females are most commonly affected.

Escherichia coli(41.8%) was still the most common uropathogen in inpatients and community acquired UTI.This is in correlation with many studies like Tambekar et al[2],Gupta et al[3],Savas et al [5]. Klebsiella spp(33.7%) being the second commonest followed by coagulase negative Staphylococcus(6.25%), Pseudomonas spp (3.75%), Enterococcus spp (3.12%) ,Acinetobacter spp (3.1%),Staphylococcus aureus (2.5%), Enterobacter spp(0.6%).

ISOLATE	Tankhiwale et al 2003[6]	Tambekar et al 2006 [7]	Taneja et al 2006 [8]	Gupta et al 2007[9]	Arjunan et al 2010 [10]	Bhargavi et al 2010 [11]	Present study. 2013
Escherichia coli	49.8	59	47.1	69.9	31.03	49	41.87
Klebsiella spp	37.8	10	15.6	25	12.06	21	33.75
CONS	1.84	-	-	0.59	-	-	6.25
Pseudomonas spp	6.5	15	5.9	0.89	17.24	4	3.75
Enterococcus spp	0.46	-	8.7	0.8	-	12	3.12
Stapylococcus aureus	0.9	-	1.7	0.19	1.72	14	2.5

Table 10. Comparison of percentage of uropathogens isolated in the present study with previous Indian reports.

In Gram positive organisms highest resistance was seen with penicillin which was 100%.Resistance in Staphylococcus aureus for oxacillin was 100% which means all the strains isolated were MRSA.100% sensitivity was seen with vancomycin.

The lowest resistance rates were noted with amikacin, imipenem and piperacillin/tazobactam which make them the best choice of treatment. Slightly elevated rate of resistance was seen with amikacin in CONS.

Among the hospitalized patients Escherichia coli predominated, followed by Klebsiella spp, CONS, Acinetobacter spp, Pseudomonas spp, Staphylococcus aureus, Enterococcus spp and Enterobacter spp.

In this study it was observed that ESBL production was 91.04% in Escherichia coli, 77.77% in Klebsiella spp, in Pseudomonas spp it was 50%.

In this study it was observed that MBL production was 2.98% in Escherichia coli, 50% in Pseudomonas spp, 16.66% in Klebsiella spp.

In this study Gram negative bacilli isolated from UTI were sensitive to amikacin and imipenem and Gram positive organisms were sensitive to vancomycin and imipenem except enterococci showed 100% resistance to vancomycin.

In this study most of the UTIs caused by Eshcherichia coli were resistant to beta lactams and fluoroquinolones. Higher resistance rates to all antibiotics tested in our study may be explained by high and uncontrolled consumption of these antibiotics during the past decade in our institute. All antimicrobials are available as over-the-counter drugs without requiring the physicians prescriptions in country. The present study emphasizes the need for constant monitoring of susceptibility of uropathogens in different regions to commonly used anti-microbial agents.

CONCLUSION

Before starting an empirical therapy, knowledge of etiology, the predisposing factors and susceptibility patterns of the uropathogens is essential to avoid irrational antibiotic usage. There is a need for developing specific guidelines for antibiotic usage for UTI in India. The treatment of UTI by antimicrobials should be guided by in vitro sensitivity testing because of existence of multi drug resistant organisms. No particular group of antibiotics can be presumed to be 100% effective without antimicrobial susceptibility and minimal inhibitory concentration testing. Infection control policies and restriction of over-the-counter sale of antibiotics without physician prescription should be strictly followed in our country. Continuous monitoring of resistant phenotypes and surveillance studies should be carried out. Empirical treatment guidelines of urinary tract infection should be changed according to regional or institutional invitro susceptibility data. Monitoring of ESBL production and antimicrobial susceptibility testing are necessary to avoid treatment failure in patients with UTI

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