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A RETROSPECTIVE STUDY OF PATTERNS OF USAGE OF ANTIMICROBIAL THERAPY IN URINARY TRACT INFECTIONS.

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ABSTRACT

Background: Urinary tract infections are the second most common infectious diseases for empirical antimicrobial therapy. Due to inappropriate selection of the antibiotic there is an increasing antibiotic resistance among the typical UTI pathogens. **Material and methods**: This was a retrospective study done on patients diagnosed with acute UTI by accessing the data as per a proforma from the medical records department, Kasturba Hospital. Patients of age >18 yr of both sexes were included in the study. **Results**: Around 102 patients records were accessed. There were equal number of males and females (51 each). Majority (44.12 %) of the cases were seen in 41-60 y age group, followed by (40%) in more than 60 y and 17 % between 21- 40y. Primary infection was seen in 73.5 % of the cases and the rest were recurrent. The most common micro-organisms causing were *E.coli, proteus, enterococcus, klebsiella* and *pseudomonas*. Third generation Cephalosporins were commonly used, followed by levofloxacin, co-trimoxazole, piperacillin- tazobactum and amoxicillin-clavulanic acid as empirical therapy. Based on the culture sensitivity analysis *E.coli* was found to be more sensitive to cefaperazone and amikacin antibiotics and resistant to norfloxacin, ampicillin etc. The immunocompromised conditions associated were diabetes, AIDS, tuberculosis and rheumatoid arthritis. Most common risk factors associated were benign prostatic hyperplasia, urethral stricture, calculi, pelvic inflammatory disease and renal failure. **Conclusion**: Due to the rise in resistant micro-organisms, there is an increasing need for judicious use of antibiotics in UTI. This data may help us in establishing an antibiotic usage guideline for the treatment of UTI.

KEYWORDS: antimicrobial agent, cephalosporins, drug resistance, *E.coli*, microorganisms.

INTRODUCTION

Urinary tract infections (UTIs) are the most common infectious diseases with an incidence of 18 per 1000 persons per year.[1] Outpatient visits due to UTIs is 4% and a woman's lifetime risk of UTI is greater than 50%.[2 & 3] Women are hospitalized more than men however; mortality rates are lower than men because of the complicated nature of UTIs in men.[4]

Conventionally UTI are classified into acute, uncomplicated, complicated and asymptomatic bacteriuria. Complicated UTI could be due to anatomical, structural or functional abnormalities of urinary tract (stents, stones or tumors), impairment of renal function due to parenchymal diseases and immunosuppressive state of the patient(Diabetes or AIDS). [5] It is important to differentiate between complicated and uncomplicated because duration of therapy is longer in complicated.[6]

The most common etiology is due to gram negative organisms like *E.coli, Klebsiella, Enterobacter and Proteus*. Other pathogens causing are *Staphylococcus epidermidis, Staphylococcus saprophyticus* & *Enterococcus* species. Infections caused by indwelling catheters are due to *Mycoplasma* species & *Ureaplasma urealyticum.*[7] Various antibiotics have been used to treat UTI like amikacin, ciprofloxacin, ceftazidime, gentamycin, nitrofurantoin, cotrimoxazole, cephalexin and ampicillin. The selected antimicrobial agents should achieve sufficient concentration in urine.[7]

Normally UTIs are treated with empirical therapy. Once culture and sensitivity report is available, specific antimicrobial therapy is started.[5] The factors which help in selection of empirical therapy are complicated or uncomplicated urinary tract infections, spectrum of activity of the drug, history of hypersensitivity reaction, comorbid conditions, risk factors, previous surgeries or urological intervention and immunocompromised state. Prevalence of UTI is rampant especially in developing countries like India; nevertheless, awareness of the locally prevalent uropathogenic strains and their antibiotic sensitivity pattern is mandatory in order to choose an appropriate antibiotic. Due to increase in antimicrobial resistance, counteracting the UTIs has become a real threat to the clinicians.

The objective of the study was to ascertain the drug prescribing pattern in urinary tract infections in a tertiary care hospital and to evaluate the different treatments given for a

particular type of UTI. This study may also contribute in planning the hospital antibiogram, which would help the clinicians to assess the local susceptibility rate and monitoring resistance trends over a period of time within an institution. It will also help in studying the various resistance trends among microorganisms in ICU and ward settings. Finally it would help the hospital for making empirical antibiotic policy.[8]

While selecting antimicrobial agents it is very prudent to consider the patient and causative organism related factors, not to solely depend on the hospital antibiogram.

MATERIAL AND METHODS

This study was a student project conducted in Kasturba Hospital, Manipal after obtaining ethical approval. It was a descriptive retrospective study done on 102 patients of all age groups for a duration of two years in the urology department .Patient records were retrieved from the medical record department. Demographic profile, type of infection-primary/recurrent/reinfection, past medical or surgical history, were recorded. Antibiotic culture and sensitivity report, presence of risk and complicated factors were recorded; Laboratory findings related to hematology, biochemistry, urinalysis and radiology were also recorded. Medications administered during visit to the hospital and post discharge were noted especially dose, duration and frequency of drug administration.

RESULTS

Around 102 patients records were accessed .There were equal number of males and females(51 each).Majority (44.12 %) of the cases were seen in 41-60 y age, followed by (40%) in more than 60 y and 17 % between 21-40y . Primary infection was seen in 73.5 % of the cases and the rest were recurrent. The most common micro-organisms isolated from the urine culture was *E.coli (80%), followed by* enterococcus and Klebsiella (6.9% each), *pseudomonas (4.7%) and proteus(1.5%).*

Majority were gram negative organisms accounting for 93.7% and 6.3% were gram positive organisms. Out of 15 different antibiotics given to treat UTI. The number of drugs resistant to the micro-organisms was more than the drugs which were effective against the uropathogens. *E.coli* and *Klebsiella* were sensitive to maximum number of drugs.

Gentamicin was found to be sensitive to all the five organisms, followed by netilmycin, piperacillin and tazobactum combination and cotrimoxazole were sensitive to four organisms;

amikacin, cefotaxime, cefoperazone + sulbactum ,ticarcillin + clavulanic acid were sensitive to three organisms. Ampicillin, meropenem, norfloxacin were sensitive to two organisms whereas astreonam, cefepime, colistin & polymyxin to one. All the five organisms were resistant to all most all antibiotics except amikacin, cefotaxime, gentamicin, netilmycin & cotrimoxazole (resistant to four micro-organisms).Table 1.

Table1-Showing number of organisms sensitive and resistant to each antibiotic

DRUGS USED	NO.OF ORGANISMS SENSITIVE (OUT OF 5)	NO. OF ORGANISMS RESISTANT (OUT OF 5)
AMIKACIN	3	4
AMPICILLIN	2	5
AZTREONAM	1	5
CEFOTAXIME	3	4
CEFEPIME	1	5
GENTAMICIN	5	4
CEFPERAZONE+SULBACTUM	3	5
MEROPENAM	2	5
NETILMYCIN	4	4
NORFLOXACIN	2	5
PIPERACILLIN+TAZOBACTUM	4	5
TICARCILLIN+CLAVULINIC ACID	3	5
COTRIMOXAZOLE	4	4
COLISTIN	1	5
POLYMYXIN	1	5

The uropathogen *Proteus* was found to be resistant to ampicillin, aztreonam, cefipime, cefoperazone + sulbactam, meropenem, norfloxacin, piperacillin+ tazobactum, ticarcillin+ clavulanic acid, colistin and polymixin.It was sensitive to amikacin,amoxicillin + clavulanic acid,cefotaxime,cefuroxime,gentamicin,netilmycin and cotrimoxazole.

E.coli was more sensitive to amikacin (58.82%), cefoperazone + sulbactam (50.98%),netilmycin (49.01%),piperacillin + tazobactum (47.05%) and ticarcillin+clavulanic acid (23.52%).Whereas it was totally resistant to colistin & polymyxin,aztreonam (96.07%) ,cefuroxime and ampicillin (90.19%).

Enterococcus had the same percentage of sensitivity (25%) to ampicillin, gentamicin, cefoperazone + sulbactam, piperacillin + tazobactum and ticaricillin + clavulanic acid. It was

totally resistant to amikacin, amoxiclav, aztreonam, cefotaxime, cefuroxime, cefepime, meropenem, netilmycin and norfloxacin.

Klebsiella was more sensitive to cotrimoxazole whereas totally resistant to polymyxin,colistin,ticarcillin + clavulanic acid, ampicillin,aztreonam and cefepime.

Pseudomonas was uniformly sensitive to gentamicin,netilmycin,piperacillin+ tazobactum and ticarcillin+clavulanic acid. It was totally resistant to amikacin,ampicillin,amoxicillin + clavulanic acid,aztreonam,cefotaxime,cefuroxime,cefepime,meropenem,norfloxacin and cotrimoxazole.Table 2.

The immunocompromised conditions associated were diabetes mellitus, AIDS, pulmonary and abdominal tuberculosis, systemic lupus erythematosus and rheumatoid arthritis. Most common risk factors associated with primary UTI were vesicourethral reflux, benign prostatic hyperplasia, urethral stricture, ureteric calculi, pelvic inflammatory disease, renal cyst, post TURP and renal failure.

Table 2-Showing the percentage of uropathogens sensitive each antibiotic.

	Proteus	**E.coli**	**Enterococcus**	**Klebsiella**	**Pseudomonas**
TOTAL(N=63)	**n=1**	**n=51**	**n=4**	**n=4**	**n=3**
% OF ORGANISMS	**S**	**S**	**S**	**S**	**S**
DRUG NAMES:					
AMIKACIN	100 (1/1)	58.82 (30/51)	0	50 (2/4)	0
AMPICILLIN	0	9.8 (5/51)	25 (1/4)	0	0
AMOX-CLAV	100 (1/1)	21.56 (11/51)	0	25 (1/4)	0
AZTREONAM	0	3.92 (2/51)	0	0	0
CEFOTAXIME	100 (1/1)	19.6 (10/51)	0	25 (1/4)	0
CEFUROXIME	100 (1/1)	9.8 (5/51)	0	25 (1/4)	0
CEFEPIME	0	13.72 (7/51)	0	0	0
GENTAMICIN	100 (1/1)	21.56 (11/51)	25 (1/4)	75 (3/4)	33.33 (1/3)
CEFAPERAZONE + SULBACTUM	0	50.98 (26/51)	25 (1/4)	25 (1/4)	0
MEROPENAM	0	39.21 (20/51)	0	25 (1/4)	0
NETILMYCIN	100 (1/1)	49.01 (25/51)	0	50 (2/4)	33.33 (1/3)

NORFLOXACIN	0	5.88 (3/51)	0	25 (2/4)	0
PIPERCILLIN+TAZOBACTUM	0	47.05 (24/51)	25 (1/4)	25 (1/4)	33.33 (1/3)
TICARCILLIN+ CLAVULANIC ACID	0	23.52 (12/51)	25 (1/4)	0	33.33 (1/3)
COTRIMOXAZOLE	100 (1/1)	13.72 (7/51)	50 (2/4)	50 (2/4)	0
COLISTIN	0	0	0	0	33.33 (1/3)
POLYMYXIN	0	0	0	0	33.33 (1/3)

DISCUSSION

Studies have shown that an increase incidence of UTI is seen above 20 y of age.[9] The most common isolated organism is gram negative bacteria *E.Coli* , which is similar to the reports published by previous studies.[10] The uropathogens *Proteus, E.coli* and *Pseudomonas* is sensitive to piperacillin+ tazobactum combination . *Klebsiella* was found sensitive to only cotrimoxazole. *E.coli, pseudomonas* and *enterococcus* was found to be sensitive to ticarcillin + clavulanic acid. *E.coli* is found to be sensitive to piperacillin + tazobactum,ticarcillin + clavulanic acid, cefoperazone + sulbactam, amikacin and netilmycin which is similar to a study done by Mohan J et al[11] which showed increase sensitivity of *E.coli* to amikacin, cefoperazone + sulbactam and also some strains were sensitive to piperacillin + tazobactum combination. Improper use of antibiotics results in emergence of resistant strains, hence there is an increasing need for judicious use of antibiotics in Urinary tract infections.

CONCLUSION

Due to emergent resistant strains in the community, it is better to be aware of the uropathogens sensitivity to the antimicrobial agents, which would help to formulate an antibiogram for different situations like for outpatients, inpatients and Intensive Care Unit settings.

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