Bacteriological Study of Urinary Tract Infection

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Abstract

This study was done to find out the common bacteria causing urinary tract infection (UTI) and to determine the Antibiotic susceptibility pattern of the urinary pathogens from S.V.R.R General Hospital ,Tirupati.Studies to know the most common causative agents and their susceptibility pattern will help the clinicians to choose the antibiotic for empirical treatment.The prevalence ofUTI in the present study was found to be 40.2%.And the prevalence was found to be higher in females {49%} than in males(29%.)For the purpose of the study ,139 mid-stream urine samples from the suspected UTI patients were screened for the presence of bacteria in urine.In all the cases clean catch mid stream urine samples were analysed by culture technic.Antimicrobial susceptibility test were performed for the isolated pathogens using Kirby-Bauer disk diffusion method. It was found that the rate of culture positivity in females was 49%and in males was 29%.E.coli was the most frequently isolated urinary pathogen,(39%,)followed by Klebsiella(30%)E.coli was highly sensitive to Ceftrixone(68 .1%) and cefotaxime(63.6%)and it was highly resistant to cotrimoxazole(27.2%). It was concluded that ,higher prevalence of UTI was seen in females.E.coli is the predominant organism isolated in UTI.Urinary pathogens showed resistance to commonly used antibiotics like cotrimoxazole,nalidixic acid.The susceptibility and resistance patterns of Urinary pathogens should be considered before starting empirical treatment for UTI.
Key words:Urinary tract infection,urinary pathogens,antimicrobial Susceptibility.

Introduction

UTI S are the most common infections in clinical practice [1]   UTI is One of the most important cause of morbidity in the general population. Urinary tract is second only to the respiratory tract in acquiring microbial infection,especially In females because of short urethra [2]   ,and various positions of the urethral openings.The most common pathogenic organism of UTI are Escherichia coli,Staphylococcus saprophyticus and less common organisms are proteus,Klebsiella Pneumoniae,Pseudomonas aeruginosa, Enterococci and candida albicans [3] .Treatment of UTI cases is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens[4].In spite of the availability and use of the antimicrobial drugs, UTIs caused by bacteria have been showing increasing trends in Recent years.Much of the increase has been related to emerging antibiotic resisance in urinary tract pathogens[5].The prevalence of antimicrobial resistance in urinary pathogens is increasing world wide .Accurate bacteriological records of culture results may provide guidance on empirical therapy before sensitivity patterns are available[6].This study was done to find out the common bacteria causing UTI and to determne the antibiotic susceptibility pattern of the urinary pathogens

.we report the prevalence and antibiotic pattern of urinary pathogens causing UTI one year period from a S.V.R.R. General hospital in Tirupati.

Methods

The prospective study of urinary tract infection was under taken by Collection of 139 urine samples from the suspected UTI patients referred by physicians of tirupati government hospital were collected in sterilized containers.the name age andsex and address of the patients was also recorded.Clean catch mid stream urin about 10 ml Was collected in a universal container,Samples thus collected were transported to the Microbiology laboratory and processed with in one hour[7]. In case of delay the samples was refrigerated at 4°c for as long as 24 hours.The urine samples were observed macroscopically for its colour,And deposits.A drop of uncentrifuged well mixed urine was taken on a clean slide and was allowed to air dry.It was heat fixed and stained by Grams method of staining for a qualitative study of the Microorganisms,and epithelial cells present in urine.

A semiquantitative method was adopted for the primary isolation organism using a calibrated loop which delivers 0.01ml of urine on Blood agar with

5% sheep blood and MacConkey`s agar.The culture plates were incubated at 37°c for 24-48 hours.Bacteriuria with $>10^5$cfu∕ml of urine was confirmed by the count [8]   . A growth of $>10^5$colony forming units∕ml was considered as Significant bacteriuria [9].

On the basis of colony morphology, And cultural characteristics the isolates were futher identified by gram`staining and biochemical reactions using appropriate sugars and special tests were performed according to the standard methods given in practical medical microbiology.Antimicrobial sensitivity of the confirmed Microorganisms was done by disc diffusion method on Muller Hinton agar.Antibiotic

Susceptibility tests and interpretations were carried out for bacterial isolates by the

Kirby-Bauer technique[10].The zone of inhibition was measured and reported .Aclear zone of inhibition around the disc indicates sensitivity and their absence resistance. [11]

Results

A total of 139 samples were collected in the study period of which77(55.39%) were from females and rest 62(44.60%) samples were from males. Pathogenic bacteria were isolated in 56 samples with a prevalence Rate of 40.2%.The prevalence in females was 49% and the prevalence rate in males was 29%,The Prevalence pattern in males and females is shown in table 1.

Table 1: Sex wise distribution of prevalence of Urinary tract infection

sex	Number of cases tested	Number of positive	percentage
Males	62	18	29%
Females	77	38	49%
Total	139	56	40.2%

Out of the total number of 139 urine samples 56(40.2%) individuals were identified by culture to have Significant bacteriuria.

UTI was most commonly seen in the age group of 21-30years as 61.1% of samples were in this age group .The lower percentage of positive cases(16.6%) was seen in the 01-10 years.

Table 2: The age wise distribution of the samples and their positivity

Age in years	Number of cases tested	Number of positive(significant bacteriuria)	percentage
01-10	18	03	16.6%
11-20	10	05	50%
21-30	36	22	61.6%
31-40	31	11	41.9%
41-50	20	07	35%
51-60	13	05	38.4%
61-75	11	03	27.2%
Total	139	56	40.2%

Table 3: Frequency of isolation of various urinary pathogens.

Sl no	Organism isolated	No of organisms	percentage
1	Escherichia coli	22	39%
2	Klebsiella	17	30%
3	Coagulase positive staphylococci	01	1.7%
4	Proteus spp	01	1.7%
5	enterococci	03	5.3%
6	Escherichi coli and klebsiella spp	08	14%
7	Escherichia coli and enterococci	01	1.7%
8	Klebsiella spp and coagulase positive staphylococci	01	1.72%
9	Pseudomonas and klebsiella spp	02	4%

Table :3   The pattern of isolates.out of the total 56 isolates,Escherichia coli (39%)was the predominant Organism,followed by other uropathogens such as Klebsiella spp(30%),proteus spp(1.72%),Coagulase positive Staphylococci(1.72%) and Enterococci(5.3%),Escherichia coli and Klebsiella spp(14%),Escherichia coli and Enterococci(1.72%) ,and Klebsiella spp and Coagulase positive Staphylococci (1.72%),and pseudomonas and Klebsiella spp (4%).The present study yielded five types of monobacterial isolates and Four types of polybacterial isolates.

Table 4: percentage of in vitro Antibiotic sensitivity pattern of most frequently
 Isolated microorganisms.

Drug	E.coli	Klebsiella
cotrimoxazole	27.2%	24%
Gentamycin	31.8%	24%
Amikacin	59%	35%
Cefotaxime	63.6%	35%
Nalidixicacid	40.9%	24%
Norfloxacin	54.5%	35%
ciprofloxacin	63.6%	47%
Ceftriaxone	68.1%	47%
CeftaZidime	50%	47%

From the above table it was found to be that Escherichia coli was sensitive to Ceftriaxone(68%) followed by Cefotaxime (63.6%),Ciprofloxacin(63.6%),Amikacin(59%) ,Norfloxacin(54.5%), Ceftazidime(50%)Nalidixic acid(40.25%)Gentamycin (31.8%)and Cotrimoxazole (27.2%)and Klebsiella spp showed sensitivity to Ceftrixone (47%),Cetazidime(47%) Ciprofloxacin(47%)) Cefotaxime (35%)), ,AmiKacin (35%), Norfloxacin (35%) Nalidixic acid (24%),Gentamicin(24%) and Cotrimoxazole(24%).

Discussion

Effective management of patients suffering from bacterial UTIs commonly relays 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 good example of the need for close cooperation between the clinician and the microbiologist [12].In our study the prevalence rate of isolation of urinary pathogen was 40.2%.In a similar study by Das RN etal isolation rate was 71.6%.prevalence of UTI was more in females when compared to males .This was in agreement with other studies by Bashir MF etal[13] and Getenet B.etal[14] Women are more prone to UTIS than men because in females , the urethra is much shorter and closer to the anus[15.]Higher proportions of patients were in the age group between 20-30 years followed by <20 years group .This was in consistent with a study by Beyene G etal 12 in which 53.5% were in the age group between in 19-39 years.

E.coli was the most common isolated organism in our study .This was is seen in other studies by Gupta etal[16] Moges etal [17]Sibi etal[18] .The second most common isolated pathogen was Klebsiella in our study accounting for 30%. This was in agreement by Khameneh etal [19] and Chin etal[20]In our study E.coli was most resistant to cotrimoxazole,followed by Gentamycin and nalidixic acid ,Norfloxacin.It was most Sensitive to Ceftriaxone (68%) followed by Cefotaxime (63.6%).The similar findings were seen in a study by Bashir MF etal who concluded that the organisms showed Resistance to older urinary antimicrobial agents such as cotrimoxazole,gentamycin Nalidixicacid which indicates that increased consumption of a particular antibiotic can be a pathway to its resistance.Antimicrobial resistance is a natural biological response of microbes to antimicrobial drugs .Resistance may be inherent[21].Our study showed the susceptibility pattern for E.coli as Ceftriaxone>Cefotaxime>Ciprofloxacin >Amikacin.The susceptibility pattern for Klebsiella was Ceftriaxone> Ceftazidime> Ciprofloxacin> Cefotaxime>Amikacin.All the most frequently isolated organisms showed resistant to commonly used antibiotics like Cotrimoxazole, Gentamycin,Nalidixicacid,Norfloxacin.

Conclusion

Higher prevalence of UTI was seen in females.Gram negative organisms were the most commonly isolated organisms in UTI among which E.coli was the most frequent causative agent .Urinary pathogence showed resistance to commonly used antibiotics like Cotrimoxazole,Gentamycin,Nalidixicacid,Norfloxacin.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 antibiotics.

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