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RESEARCH ARTICLE

MICROBIOLOGY

PREVALENCE OF ANTIMICROBIAL RESISTANCE IN UROPATHOGENS AND DETERMINING EMPIRICAL THERAPY FOR URINARY TRACT INFECTIONS

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ABSTRACT

Analyzing antibiotic susceptibility pattern of Uropathogens helps to overcome the therapeutic difficulties created by the emerging antimicrobial resistant bacteria and guides in choosing appropriate empirical therapy. The aim of the study is to understand the susceptibility patterns of the uropathogens which assists in choosing the empirical therapy for UTI. Midstream urine samples were collected cultured and subjected to microscopical and appropriate biochemical tests for proper identification. Antimicrobial sensitivity tests were carried out by disc diffusion technique using Muller Hinton Agar. High level resistance is seen to Cotrimoxazole, Ciprofloxacin, Ceftazidime and Cefixime. Amikacin was found to be more effective against the isolates. Most of the isolates were sensitive to ceftriaxone sulbactam. From our study, Amikacin is recommended Urinary tract Infections as Empirical treatment.

KEY-WORDS

Antibiotic resistance, Empirical Treatment, UTI.

INTRODUCTION

Infections of the urinary tract are the most common infectious diseases in humans (1, 2). Intestine is usually the source of organisms producing UTI (7, 8, 9). Antimicrobial resistance occurs in intestinal bacteria due to antibiotic therapy for treating infections outside the urinary tract (8). The use of antibiotics has an influence in the spread of antimicrobial resistance among bacteria (10, 11, 12, 13, 14). The local data about the antimicrobial resistance of Uropathogens should be available for proper therapeutic interventions of UTI. Our study is to analyze the antimicrobial resistance pattern among Uropathogens and to determine the empirical therapy for Urinary tract infections.

MATERIALS AND METHODS

A total of 180 urine samples were collected from the out patients and inpatients in our hospital during the study period (March 2009–May

2009). The midstream urine specimens were obtained by clean – catch method. The samples were collected in sterile containers and cultured within one hour of collection. The samples were plated out on MacConkey and Blood agar media and incubated aerobically overnight at 37°C (16-18). Samples that showed pure growth of isolate in a count of $\geq 10^5$ colony-forming units (CFU) per ml of urine after overnight incubation were considered to indicate significant bacteriuria (9). The characteristic bacteria on the culture media were aseptically isolated and subjected to microscopical and appropriate biochemical tests for proper identification (16). Antimicrobial sensitivity tests were carried out by disc diffusion technique using Muller Hinton Agar. *E. coli* ATCC strain 25922 susceptible to all the antibiotics was used as control. The Antibiotics used for susceptibility testing in our study were *Cotrimoxazole*, *Amikacin*, *Ciprofloxacin*, *Ceftazidime*, *Cefixime*, *Ampicillin sulbactam*, *Ceftriaxone sulbactam*.

RESULTS

Figure-1

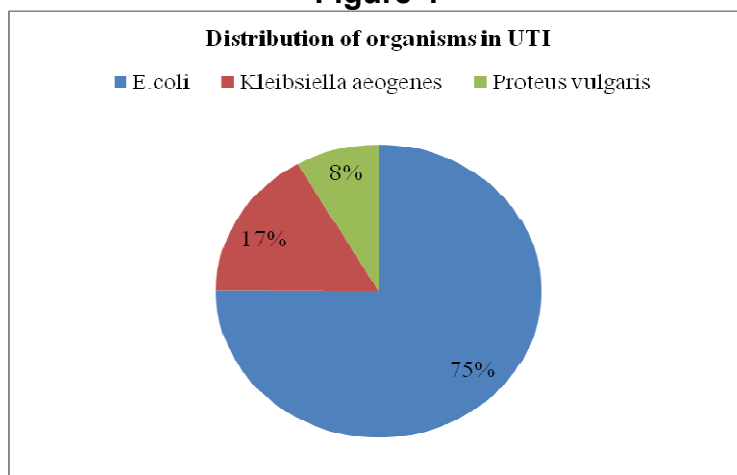


Table:1

Organisms	IP	OP	Total
<i>E.coli</i>	60	30	90
<i>Klebsiella mobilis</i>	15	05	20
<i>Proteus vulgaris</i>	08	02	10
			120

Table:2
Sensitivity and Resistance of organisms to Antibiotics(%)

Organisms	Amikacin		Ceftazidime		Cefixime		Cotrimoxazole		Ciprofloxacin		Ampicillin Sulbactam		Ceftriaxone Sulbactam	
	S	R	S	R	S	R	S	R	S	R	S	R	S	R
<i>E.coli</i>	55	45	20	80	34	66	40	60	30	70	100	0	100	0
<i>K.mobilis</i>	60	40	30	70	60	40	20	80	60	40	0	100	95	5
<i>P.vulgaris</i>	67	33	40	60	90	10	20	80	50	50	0	100	100	0

Bacterial organisms were isolated from the urine of 120 patients (Both from IP and OP) during the study. Uropathogens isolated are shown in Fig 1. Table 1 shows that *E. coli* predominated in both inpatients and outpatients followed by *Klebsiella* spp. Table 2 show the Sensitivity and Resistance pattern of isolates to different antibiotics. High level resistance is seen to Cotrimoxazole, Ciprofloxacin, Ceftazidime and Cefixime. Sensitivity of Ampicillin sulbactam to *E.coli* was 100%, whereas *K.mobilis* and *P. vulgaris* showed 95% and 100% sensitivity to Ceftriaxone sulbactam. Amikacin is found to be very effective against all the isolates.

DISCUSSION

This study shows that the pathogens causing UTI in community and hospital set up show almost same percentage of resistance. In the previous studies, the resistance to antibiotics

was more in the hospitalized patients than in the community (19). This indicates the spread of multi drug resistant strains in the community. In the present study, *E. coli* predominated amongst the hospital as well as community patients (20). *Klebsiella* spp. being the second commonest in both the patient groups. From this study, it is obvious that Cotrimoxazole is no more useful against Uropathogens as only 17 % of the isolates were susceptible for that drug. Previously this antibiotic was used as the drug of choice for, empirical treatment of UTI (21). The broad spectrum activity of Fluoroquinolones has made them as one of the best therapeutic options for UTI. In the present study the isolates showed low degree of susceptibility (40%) to Fluoroquinolones which indicates that they can no more be opted for treating UTI. It is obvious from our study that there is increased resistance for 3GC (76%) and 4GC (56%) antibiotics like Ceftazidime and Cefixime. This is an indication that many of the organisms are ESBL and Amp

C producers (22). For these organisms, drugs with inhibitors like Augmentin may be tried (22) but, which should be reserved for the last line of treatment. Most organisms are sensitive to sulbactams. Antimicrobial resistance for Nitrofurantoin has not occurred much attributed to its localized action only on the urinary tract and hence not exposed outside the urinary tract (23). It is shown in our study that sulbactams has tremendous effect (100%) against other Uropathogens (E.coli, Klebsiella spp., Proteus spp.,) which are responsible for UTI in community set up. Hence our study recommends Ceftriaxone sulbactam as the drug of choice for empirical treatment in community acquired UTI. . Amikacin also has shown strong activity against about 60% of organisms

including Proteus spp. With this evidence from our study, we can suggest Amikacin to be prescribed as the empirical treatment for UTI in Hospital.

CONCLUSION

Keeping the emerging antimicrobial resistance in mind, it is strongly suggested that the antibiotic therapy should only be commenced after the sensitivity report from the Microbiology laboratory. This would not only help in the prudent use of antibiotics but also would curb the dissemination of antimicrobial resistant strains in the community as well as in the hospital.

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