Orginal Article

Antibiotic Sensitivity Pattern of Uropathogens at Khwaja Yunus Ali Medical College Hospital

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Abstract

Increasing resistance among urinary tract pathogens to conventional drugs is found alarming worldwide. The aim of this study was to obtain data on susceptibility patterns of isolated uropathogens from urine samples of patients attending at Khwaja Yunus Ali Medical College Hospital, Enayetpur, Sirajgonj, Bangladesh a tertiary health care center of remote area to currently used antimicrobial agents.

A total of 656 urine samples were studied of which 163 (24.8%) were culture positive. Among 163 culture positive cases all uropathogenic isolates were identified. Among the isolates, E. coli was the most predominant 116 (71.1%) followed by Pseudomonas aeruginosa 29 (17.8%). Staphylococcus saprophyticus 12 (7.4%) and Klebsiella pneumoniae 4 (2.4%) and Acenatobacter sp. 2 (1.2%). The majority of isolated E. coli were sensitive to Meropenam (58.6%) and Amikacin (57.7%) followed by gentamicin (52.6%), amoxiclav (43.1%), ciprofloxacin (42.2%). Sensitivity & resistance rate in Staphylococcus saprophyticus were same (50%) in Cephradine. Where complete (100%) resistance was shown to Ampicillin in Pseudomonas aeruginosa, Klebsiella pneumoniae and Acenatobacter sp. However most of isolates were poorly sensitive to ampicillin (1.7%), erythromycin (2.5%), cefuroxin (3.4%) and amoxicillin (9.5%).

This area-specific monitoring studies aimed to gain knowledge about the type of pathogens responsible for UTIs and their resistance patterns may help the clinician to choose the right empirical treatment. Meropenem, amoxiclav, amikacin, gentamicin, second-generation of both cephalosporins and quinilones are found the most sensitive against the common uropathogens which might be used in the treatment of UTI.

Key Words: *Urinary tract, E. coli, Pseudomonas aeruginosa, Staphylococcus, Klebsiella*

Introduction

The increasing trend of emerging bacterial resistance to a large number of antibiotics undermines the ability of antibiotics to control infections [1-3]. Urinary tract infections (UTIs) are one of the most common bacterial infections both in the community and hospital setting.

An estimate of patients suffering from UTI is around 150 million per annum across the Globe, which may rise to 75% in the female population by the age of 24, and 15-25% of this group will suffer from a relapse of this disease [4-6]. By considering above facts this study is aimed to explore the trends of the antibiotic-resistant uropathogens and their susceptibility toward various

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The present study will further help in formulating the guide-lines for establishing a proper empirical therapy in Khwaja Yunus Ali Medical College Hospital, Enayetpur, Sirajgonj for UTIs while awaiting culture sensitivity reports. Meropenem, amikacin, amoxiclav, gentamycin and ciprofloxacin, the third and fourth generation cephalosporins were found the most commonly sensitive antimicrobial drugs which might be prescribed in the treatment of UTI.

Materials and Methods

This study was done in the Microbiology Laboratory Services department of Khwaja Yunus Ali Medical College Hospital in 2013. The patients comprised both sexes and all age groups. Urine samples were collected by using sterile, dry, wide mouthed leak proof plastic container and bacteriological tests were done for diagnosis of etiological agents of UTI. Standard method for isolation and identification of the organisms were carried out with all urine samples. Blood agar and MacConkey agar media were plated using a calibrated loop withdrawing 0.01 ml of urine sample. The bacterial colonies were counted and multiplied by 100 to give an estimate of the number of bacteria present per milliliter of urine. Significant growth was determined as>105 colony forming units (CFU)/ ml of midstream urine samples and>102 CFU/ml of a catheter specimen7. Gram negative bacteria were identified by morphological study, oxidase test, routine biochemical tests such as motility test, indole and urease production and Triple Sugar Iron reaction. Gram positive bacteria were identified by catalase, coagulase and Novobiocin tests. Samples which showed significant colony count were taken into consideration and sensitivity pattern of the isolated organisms was determined by modified Kirby-Bauer technique using Mueller-Hinton agar8. Interpretation of results was done measuring the sizes of zones of inhibition and reported according to "The Clinical Laboratory Standard Institute" (CLSI) guidelines9. Antibiotics for uropathogens were tested include amoxiclav, amikacin, cotrimoxazole, gentamicin, imipenem, meropenem, cephradine, ceftazidime, ceftriaxone, cefixitin, cefuroxin, ciprofloxacin, erythromycin, tetracycline, ceftriaxone, and azithromycin.

Results

Prevalence of Uropathogens:
In this study, a total of 656 urine samples were tested

during from patients of all age groups in both sexes. Among them 163 (24.85%) were culture positive (Table 1).

Table-1 Distribution of specimens with or without culture positive.

Urine culture	Frequency	Percent
Culture positive	163	24.85
Culture negative	493	75.15
Total	656	100

The most common isolated uropathogens were E. coli (71.1%) and Pseudomonas aeruginosa (17.8%). Staphylococcus saprophyticus (7.4%). Other bacterial species named Klebsiella pneumoniae and and Acenatobacter sp.were also found in patients with UTI although they were least frequent (Table 2).

Table 2 Frequency of bacterial agents isolated from urine specimens

Bacterial Isolates	Number	Percentage
Escherichia coli	116	71.1
Pseudomonas aeruginosa	29	17.8
S. saprophyticus	12	7.4
Klebsiella pneumoniae	4	2.5
Acenatobacter sp.	2	1.2
Total	163	100

This study shows, more male patients (58.3%) suffered from UTI than female (41.7%). The incidence of UTI was ranged in patients between 1-65 years old. The highest number of male patients with UTI was found within the age range of 46-65 years and female patients by the age range 31 - 45 (Table 3).

Table 3: Distribution of UTI among 163 patients in different age level and their relation to sex.

Age Level in years	Sex			
	Male (n=95)		Female (n=68)	
	Frequency	Percent	Frequency	Percent
0-5	2	2.1	1	1.5
6-15	1	1	2	2.9
16-30	6	6.3	17	25
31-45	17	17.9	24	35.3
46-65	36	37.9	18	26.5
Ø 65	33	34.7	6	8.8

Antibiotic Susceptibility:

The isolated bacteria showed wide range of differences in their susceptibility pattern to the tested antibiotics. As the result indicated, high proportions of the test organisms were sensitive to meropenem, amikacin, gentamicin, amoxiclav, ciprofloxacin, azithromycin. Again, a significant percentage of the test organisms also showed resistance to ampicillin, amoxicillin, erythromycin and carbenicillin (Table 4).

Antibiotics	Isolated uropathogens				
	E. coli	S. saprophyt	Ps. aerug	K. pneum	A. baumani
Ampicillin	1.7	16.7			
Amoxicillin	9.5	25.0	13.8		
Amoxiclav	43.1	33.3	31.0	50.0	
Amikacin	57.7	33.3	65.5		
Azithromycin	42.2	33.3	51.7	50.0	
Carbenicillin		25.0	3.4		
Ceftazidim	19.0	8.3	27.6	50.0	
Ceftriaxone	29.3	25.0	27.6		
Cefixim	17.2		10.3	50.0	
Cefuroxin	9.5	8.3	3.4		
Cephr adine	27.6	50.0	13.8	25.0	50.0
Ciprofloxacin	42.2	33.3	48.3	25.0	50.0
Cloxacillin		41.7			
Cotrimoxazole	24.1	25.0	13.8	25.0	
Doxycyclin	20.7	33.3	10.3	25.0	
Erythromycin	2.5				
Gentamicin	52.6	41.7	31.0	50.0	50.0
Imipenem	28.4	16.7	48.3	25.0	50.0
Levofloxacin	14.6		13.8		
Meropenem	58.6	25.0	55.2	25.0	50.0
Pipercillin	19.0	16.7	27.6		50.0
Tobramycin	10.3	41.7	10.3	25.0	50.0

Table 4: Susceptibility pattern (%) of bacterial agents isolated from urine specimens

Discussions

This paper describes the first study undertaken at Khwaja Yunus Ali Medical College Hospital in 2013 to evaluate susceptibility patterns of bacterial strains isolated from UTIs. It provides valuable laboratory data concerning uropathogens and enables the situation of this hospital to be compared with that in other countries. Here we described the relationships between isolated bacterial agents and antibiotic susceptibility and resistance of UTIs. The sex distribution of patients in our study is analogous with those of other reported studies, showing a predominance of males (58.3%) with UTI. The elevated incidence of infection among males is related to the differences between male and female in economic solvency and privilege which prevails in the underdeveloped countries[8]. The incidence and prevalence of UTI in both man and women was found increase with age as seen in Sweden and Finland during 2005-2007[9]. The most common uropathogens in our study were E. coli (71.1%) and Pseudomonas aeruginosa (17.8%). Although the percentage of E. coli is much higher in our study, it supports another findings of Chittagong indicating that E. coli is the principal etiological agent of UTI, accounting for 82.6% of the screened cases[10]. In another study, it was reported that predominant uropathogens are E. coli followed by Pseudomonas aeruginosa which also partially support our study where the 2nd most common uropathogens was found Klebsiella pneumoniae[11]. Infection frequency of Staphylococcus saprophyticus and Acenatobacter sp. were found to be very few in this study (Table 3) which is also be affirmed by another work. The most effective antimicrobial agents in our study were meropenem, amikacin, gentamicin, amoxiclav, ciprofloxacin, azithromycin. Again, a significant percentage of the test organisms also showed resistance to ampicillin, amoxicillin, erythromycin and carbenicillin (Table 4). It has been reported that meropenem is the most effective antibiotic against E. coli[12]. Our result was further supported by another study where the susceptibility rate of E. coli to amikacin remained 93-100%[13]. Again, most of the pathogens showed considerable resistance to ampicillin, amoxicillin, cefroxin and erythromycin (Table 4). The widespread use, more often the misuse, of antimicrobial drugs has led to a general rise in the emergence of resistant bacteria. It is reported that in the United State there is rise in the resistant strains to ampicillin due to its widespread use[14]. With this evidence from our study, we can suggest meropenem, amikacin, ceftazidime, gentamicin and imipenem to be prescribed as the empirical treatment for UTI.

Conclusion

By keeping the emerging antimicrobial resistance in mind, it is strongly recommended that the antibiotic therapy should only be commenced after the culture and sensitivity report from the microbiology laboratory. This would not only help in the sensible use of antibiotics but also would restrain the spreading of antimicrobial resistant strains in the community as well as in the hospital.

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