FREQUENCY OF COMMON BECTERIA AND THEIR ANTIBIOTIC SENSITIVITY IN COMPLICATED URINARY TRACT INFECTION

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ABSTRACT

BACKGROUND: Urinary tract infection (UTI) is the second most common infectious complaint in geriatric clinics overall, and the most common outpatient complaint caused by bacteria. Studies have found that the elderly do not lack a febrile response; that an elevated temperature was the most common initial symptom, a marker for a serious infection, and the most important clinical indicator for antibiotic treatment. Study objective was to determine the frequency of common bacteria with their antibiotic sensitivity among elderly male patients presenting with complicated urinary tract infection.

METHODS: Descriptive cross sectional study from Feb 2015 to Feb 2016. The study will be carried out in the outpatient department of Urology, Institute of Kidney Diseases (IKD), Hayatabad Medical Complex, Peshawar. Sample size was 193 using 8.8%18 of Klebsiella Pnumoniae among elderly patients with UTI, 95% confidence interval and 4% margin of error under WHO sample size estimation software.

RESULTS: In this study, 193 male patients were observed. Average age was 70.76 years + 4.48SD. Distribution of common bacteria shows that Escherichia Coli was found in majority of cases which is 77(39.90%), followed by psedudomonas aereginosa in 73(73.8%), klebsiella was observed in 66(34.2%) patients while 69(64.2%) patients have enterobacter.

CONCLUSION: High prevalence of drug-resistant urinary tract pathogens, particularly to Ciprofloxcin, Ceftriaxone and Gentamycin suggests cautious use of antibiotic therapy for the treatment.

KEY WORDS: Urinary tract infection, Antibiotics, Common Bacteria, sensitivity.

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INTRODUCTION

Urinary tract infection (UTI) is the second most common infectious complaint in geriatric clinics overall, and the most common outpatient complaint caused by bacteria.[1] The diagnosis and treatment of UTI in the elderly is not the same as treating UTI in adults[2,3].

While increased frequency and dysuria are usual symptoms of UTI, uncertainty looms around the same as these symptoms can be masked by catheterization, or be common and chronic in the elderly even in the absence of UTI.[5-10] Fever was the most common symptom of UTI in the present study as with similar studies worldwide.[11-13] Studies have found that the elderly do not lack a febrile response; that an elevated temperature was the most common initial symptom, a marker for a serious infection, and the most important clinical indicator for antibiotic treatment[15]. Whitelaw et al reported that a delay in interpreting fever as a symptom of UTI led to a high mortality rate in the elderly within 24 hours of admission[6]. In older men the incidence of complicated UTI rises dramatically (15-20%).[5,6] The risk factors for complicated UTI are enlargement of the prostate,[7] prostatism, immunosuppression,[8] advance age, functional and anatomical abnormailities,[9] urinary stones,[10] stricture, foreign bodies,[11] instrumentation[12] and surgery of the urinary tract. American and European guidelines shows that there is increase use of Fluroquinolones empirically rather than Trimethoprim/ Sulfamethoxazole, to treat UTI[13].

In a study by Ali L et al, the gram-negative rod E-Coli was the most frequently encountered microorganism in 54 (77%) in hospital acquired complicated UTI and it was responsible in 49 (83%) cases in community acquired UTI. Regarding the resistance, Ciprofloxacin was found resistant in 26 cases (37%) in hospital acquired and 18 (30%) in community acquired UTI. The injectable antimicrobial like amikacin and cefoperazone plus sulbactum had an excellent coverage for the majority of uropathogens in complicated UTI.[13]

In one study on patients with UTI, the most isolated bacterium was E. coli with frequency rate of 59%. The other bacteria were Klebsiella spp. (11.6%), Enterobacter spp. (9.8%), Pseudomonas spp. (7.2 %). All Gram-negative bacteria were more sensitive to amikacin (90.5-100%). The Gram-positive cocci isolated were more sensitive to tobramycin, kanamycin and ciprofloxacin (100%)[16]. In another study of UTI on male patients, Escherichia coli was most frequently isolated (48%), followed by other enterobacteriaceae (24%) and enterococci (9%). The etiology of infection was age-dependent; E. coli was more frequently isolate ed in younger patients and Pseudomonas aeruginosa in the elderly[17]. In anoth-

er study, E coli was most frequent isolate (66%) followed by Klebsiella Pneumonia (8.8%) and Enterococcus fecalis (5.5%) among elderly patients with UTI[18].

MATERIAL & METHODS

This descriptive cross sectional study from Feb 2015 to Feb 2016. The study will be carried out in the outpatient department of Urology, Institute of Kidney Diseases (IKD), Hayatabad Medical Complex, Peshawar. All the male patients were included in the study with culture proven complicated UTI over the age of 65 years. While those patients with immunocomprised states i.e diabetes, HIV/AIDS, patients on steroids (on medical records & history) , Patients with history of antibiotic intake in the last one week were excluded from the study.

The study was conducted after approval from hospitals ethical and research committee. All patients with complicated UTI and presenting to OPD were included in the study. The purpose and benefits of the study were explained to the patient and a written informed consent were obtained.

All patients were subjected to complete history and clinical examination followed by routine baseline investigations. From all the patients, a two specimen of clean mid stream urine (02 hours apart) were obtained and sent to hospital laboratory and were inoculated on Mackonkey agar, Mannitol salt agar, triple sugar iron agar and melezitose and 3-hydroxybutyrate to detect Escherichia coli, Pseudomonas aeruginosa, enterobacter and Klebsiella. The organism detected were checked for sensitivity against commonly used antibiotics as ceftriaxone, ciprofloxacin, co-amoxiclav, erythromycin, nitrofurantoin and ampicillin. All the culture and sensitivity procedures were done under supervision of same consultant microbiologist having minimum of five years of experience.

All the above mentioned information including name, age, sex were recorded in a pre designed proforma and strictly exclusion criteria were followed to control confounders and bias in the study results.

Data were stored and analyzed in SPSS version 10. Mean ± SD was calculated for quantitative variables like age. Frequencies and percentages were calculated for categorical variables like common bacteria (Escherichia coli, Pseudomonas aeruginosa, enterobacter and Klebsiella). Stratification were done to stratify the Common bacteria among age to see the effect modifications. All results were presented in the form of table and graphs.

RESULTS

In this study, 193 male patients with culture proven complicated UTI over the age of 65 years were included and the culture were done.

Patients age was divided in three categories, out of which most presented with culture proven complicated UTI were of age less than or equal to 70 years which were 115(59.6%) while 47(24.4%) patients were in the age range of 71-75 years and 31(16.1%) were of age range more than 76 years. The study included age ranged from 66 to 81 years. Average age was 70.76 years ± 4.48SD.

Distribution of antibiotic sensetivity in patients having urinary tract infection shows that Co-amoxiclav and ampicillin were sensitive in majority of complicated UTI paitents which were found in 61(31.60%) each, followed by ceftriaxone in 59(30.6%), ciprofloxacin was observed in 49(25.4%) patients while 56(29%) patients have shown sensitive to erythromycin. (Fig 1)

Distribution of common bacteria in patients having complicated urinary tract infection shows that Esche-

TABLE 1: DISTRIBUTION OF MIRCO ORGANISM

		Count	Percentage
E Coli	Yes	77	39.9%
	No	116	60.1%
Klebsiella	Yes	66	34.2%
	No	127	65.8%
Pseudomonas Aereginosa	Yes	73	37.8%
	No	120	62.2%
Enterobacter	Yes	69	35.8%
	No	124	64.2%

TABLE 2:ANTIBIOTIC SENSITIVITY OF COMMON BACTERIA

		E Coli	Klebsiella	Pseudomonas Aereginosa	Entero-bacter
Ceftriaxone	S	53.2%	65.2%	68.5%	62.3%
	R	46.8%	34.8%	31.5%	37.7%
ciprofloxacin	S	54.5%	53.0%	52.1%	58.0%
	R	45.5%	47.0%	47.9%	42.0%
Co-amoxiclav	S	63.6%	66.7%	67.1%	66.7%
	R	36.4%	33.3%	32.9%	33.3%
ampicillin	S	61.0%	72.7%	68.5%	68.1%
	R	39.0%	27.3%	31.5%	31.9%
erythromycin	S	55.8%	62.1%	65.8%	62.3%
	R	44.2%	37.9%	34.2%	37.7%
Nitrofurantoín	S	46.8%	59.1%	64.4%	65.2%
		53.2%	40.9%	35.6%	34.8%

S=Sensitivity R=Resistant

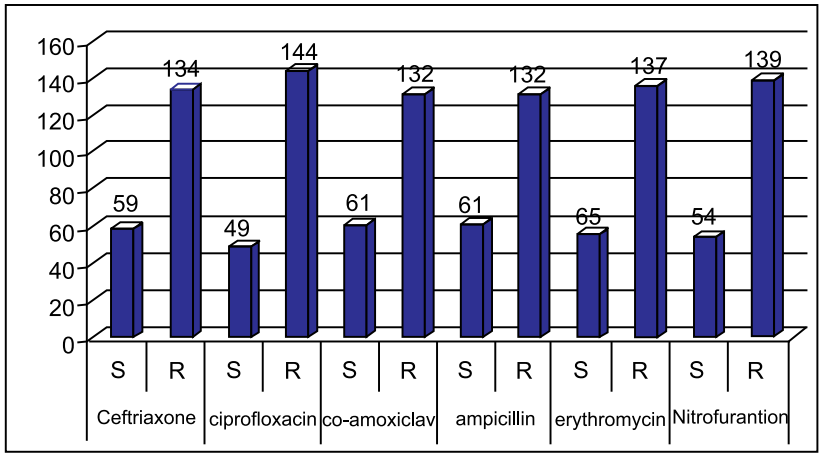

Figure 1: Antibiotic sensitivity distribution

richia Coli was found in majority of cases which is 77(39.90%), followed by psedudomonas aereginosa in 73(73.8%), klebsiella was observed in 66(34.2%) patients while 69(64.2%) patients have enterobacter. (Table 1)

Age wise distribution urinary tract infection shows that old age is more prone as that of younger age and common bacteria shows that Escherichia coli was also found in majority of the patients having age more than 76 years which was 48.4% followed by patients having age 71-75 years of age with 44.7% and 35.7% Escherichia coli was found in less than or equal to 70 years of age. Similar pattern have been followed approximately by the Klebsiella, pseudomonas aerginosa and Enterobacter.

The antibiotic sensitivity of common bacteria shows that ampicillin was more sensitive while ciprofloxacin was more resistant in different micro-organism. The rest of antibiotics sensitivity and resistant has given in (Table 2).

DISCUSSION

UTI is frequently encountered in patients with diabetes and in those with structural and neurological abnormalities, which interfere with urinary flow. The prevalence of antimicrobial resistance in both out and hospital patients with UTI is increasing and can vary according to geographical and regional location.19

Increasing frequency of prostate disease in males are responsible for increasing the incidence of UTI in elderly patients[20].

The mechanisms which potentially contribute to UTI in these patients are defects in the local urinary cytokine secretions (IL-8, IL-6), increased adherence of the microorganisms to the uroepithelial cells, partly due to a changed and lowered Tamm Horsfall protein, and granulocyte dysfunction, possibly as a result of an abnormal intracellular calcium metabolism.[21,22] On the other hand, hyperglycemia facilitates the colonization and growth of variety of organism.[23]

E. coli was the predominant bacteria found in our study, Isolation of Escherichia coli as the predominant pathogen of community associated UTI has been extensively reported in many studies.[24,25] Although, the decline in E. coli isolation (55.1%) rate in our setting remains unclear. But, similar low rate isolation E. coli have also been reported by investigators from developed and developing countries[26].

One another study also show that the most common organisms causing UTI are E. coli while Proteus, Klebsiella, Streptococcus and Staphylococcus epidermis also commonly the causative agents.[27] Both in community and hospital settings, antimicrobial resistance among uropathogens causing urinary tract infections is also increasing.[28] E. coli is the most frequently found bacteria in UTI patients from both these settings which accounts for 80-90% of UTI cases.[29,30]

Similar result was found by S. Manikandan et al (2011)[31,32] showed that E.coli was 31.5% predominant in their study. The multiple antibiotic resistant indices (MARI) calculated for E. coli was 0.61, 0.69 and 0.46. This study was correlate with the study of D.H. Tambekar et al (2006)[33] who found that the MARI of E.coli was 0.85, 0.52 and 0.38. E. coli was highly resistant to Gentamicin (90%, MARI – 0.069), Ciprofloxacin (80%), Penicillin (80%, MARI – 0.061) and Ceftriaxone (80%, MARI – 0.061). The overall rate of resistance against E.coli was worldwide reported which was similar with the study of Mandal et al. (2001)[34] showed E. coli as the commonest cause of UTI and antibiotic resistance was high among the strains, which emphasize the need for judicious use of antibiotics. Certain virulence factors like haemolysin production and presence of fimbriae in the E. coli may be associated with urovirulence.

H. Tambekar et. al.,[33] (2006) who found that MARI for S.aureus was 0.61. S. aureus showed 75% resistance to Methicillin, Oxacillin, Vancomycin, Gentamincin, Tetracyclin and Penicillin and their MAR indices for antibiotics was found to be 0.057. The MAR indices for Ps. aeruginosa were1.0, 0.8 and 0.6, Ps. aeruginosa was highly resistant to Ampicillin (100%) antibiotics with MARI was 0.076 whereas this organism also 80% resistance to Ceftriaxone, Gentamincin, Norfloxacin and Tetracyclin with MAR index was 0.061. The highest MAR indices for Proteus vulgaris were found to be 0.46 and these bacteria was resistance to Tobramycin (80%) antibiotic. This bacteria also showed high resistant to Ciprofloxacin, Sparfloxacin and Penicillin. This study showed some similarities with the study of Kolawale AS et. al (2009)[35]. Kl. Pneumoniae and Serratia marscences showed similar results with antibiotics resistance. Both the bacteria were 50% resistance to 4 to 5 antibiotics whereas Serratia marscences showed 100% resistance to Penicillin antibiotics with their MAR index 0.076. This study was comparable with the study of El-Mahmood Muhammad Abubakar (2009)[36].

Resistance rates among common uropathogens to many commonly used antimicrobial agents have increased over the years and theses

resistance rates vary from country to country.[37] In our country set up the least effective drugs are amoxicilline–clavulanic acid, tetracycline, trimethoprim-sulfamethoxazole and ampicillin[37].

CONCLUSION

The bacterial susceptibility and resistance profile of all isolates in this study have shown that ciprofloxacin, ceftriaxone, gentamycin remain the most effective drugs against pathogens. The present study confirms that bacterial resistance would be a greatest problem in the country. Finally, we suggest that empirical antibiotic selection should be based on knowledge of the local prevalence of bacterial organisms and antibiotic sensitivities rather than on universal guidelines.

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CONFLICT OF INTEREST

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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.