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URINARY TRACT INFECTION IN DIABETIC PATIENTS; CAUSATIVE BACTERIA AND ANTIBIOTIC SENSITIVITY

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ABSTRACT

Objective: To find Common bacteria causing Urinary tract infection in diabetics with antibiotic sensitivity pattern.

Material and Methods: This Descriptive cross sectional study was conducted in Department of Medicine, Khyber Teaching Hospital, Peshawar from October 2012 to March 2013. Two hundred and ninety two diabetic patients having UTI on Urine RE were selected; their Culture reports were performed and analyzed using SPSS 17.0.

Results: Culture positive UTI was found in 51% patients, more prevalent in patients older than 55 years; frequencies varied with age (p=0.006). E.coli was found in 113(75.80%) cases, followed by P.aeruginosa 108(72.5%), Proteus 104(69.8%), and S.aureus 101(67.8%). E.coli was most frequent in patients older than 55 years (p=0.01). Bacterial isolates did not vary with gender (p>0.05). Gentamycin was most sensitive while Augmentin most resistant.

Conclusion: Most common bacterial isolate is E.coli, with high prevalence of drug-resistance particularly to Augmentin, Ciprofloxacin and Ceftriaxone.

Key Words: Urinary tract infection, diabetes, Antibiotics, Urine RE.

INTRODUCTION

Diabetes mellitus is one of the most challenging health problems of 21st century and is the fifth leading cause of death in developed countries[1]. Asian patients are considered to have a higher risk of developing diabetes and potentially worse prognosis. By 2025, the number of individuals with diabetes is expected to be more than double[2].

One of the common complications of diabetes is its effect on genito-urinary system. Diabetic patients are at increased risk of urinary tract infections. Diabetes causes several abnormalities in the host system that increases the risk of urinary tract infection. These include immunologic impairments such as defective migration, phagocytic alteration of chemotaxis in polymorphonuclear leukocytes[3]. Diabetics are at increased risk of developing acute pyelonephritis, renal abcess, bladder scaring and pyelitis[3]. Emphysematous pyelonephritis is almost exclusively an infection of diabetic patients and carries a grave prognosis; papillary necrosis complicates 21% of cases[4].

Treating UTIs with broad spectrum antibiotics is widely practiced; however, because of concerns about infection with resistant organisms, treating with a narrow spectrum antibiotic may be more appropriate. It is more preferred to use fluoroquinolones as initial agent for empiric therapy of UTI in an area where there is a high concern about antibiotic resistance[5,6]. The reason for this is their high bacteriological and clinical cure rates, and low resistance rates among most uropathogens[7-9]. The antibiotic resistance which, today, is a serious issue worldwide has invariably been resulted from extensive use of antimicrobial agents[10].

The resistance pattern of community acquired uropathogens has not been studied extensively[7]. In both community and hospital acquired UTI, the etiology and the antibiotic resistance pattern have been changing over the span of last few years[11,12]. However, much information on etiology and resistance pattern of community acquired UTI in Pakistan is not available.

The fact that antibiotic sensitivity changes with time[13,14]; therefore knowledge of common bacteria involved and their current sensitivity pattern will help us not only in providing the best initial empirical therapy but also in preventing the long-term morbidity. This will have favorable effect on patient outcome and health related expenditures.

MATERIAL AND METHODS

This descriptive, cross-sectional study was conducted at Khyber Teaching Hospital, Peshawar, Pakistan; from October 2012 to March 2013. This is a tertiary care hospital which receives patients from across the City and the province. Consecutive (non-probability) sampling was done and sample size was calculated to be 292 using WHO sample size calculator.

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All Diabetic patients showing UTI on Urine Routine examination (Urine RE) or dipstick method were included in the study. Patients who have used antibiotics in last 48 hours, patients who refused to participate in the study and patient with documented anatomical abnormalities of the genitourinary tract (based on history and past medical record) were excluded from the study.

Diabetes was defined as symptoms of diabetes plus random blood sugar $\geq$ 11.1mmol/ or fasting blood sugar > 7mmol/L and or HbA1c > 6.5%.Whereas, UTI was defined as Culture showing growth of 105 organism/mL and > 5 leucocytes /HPF.

Study was conducted after approval from hospital ethical and research committee. Informed consent was obtained from all patients. Patients meeting the inclusion criteria were selected through Out Patient Department, ER, and Medical wards. Data was collected using a performa. The patients were educated how to collect clean catch and mid stream urine in a sterile container which were later sent to hospital laboratory for culture and sensitivity. Data were analyzed using (SPSS) version 17.0. Nominal variables like age groups, gender and bacterial isolates were analyzed using Chi-square test of independence (χ^2). Results were considered statistically significant with p-value < 0.05, at 95% level of significance.

Table 1: Age wise distribution of patients

Age in years	Frequencies with percentages
Age < 40	108(37%)
Age 41-55	133(45.5%)
Age >56	51(17.5%)
Total	292(100%)

RESULTS

A total of 292 diabetic patients showing UTI on Urine RE were included in the study, out of them 150(51.37%) were females and 142(48.63%) were male patients. Female to male ratio was 1.1:1. Mean Age was 45.45 years ± 10.82 SD (age ranged from 30 to 74 years). Patients age was arbitrarily divided into three groups i.e., less than or equal to 40 years, from 41-55 years and from 55 years onwards. The distribution of patients in different age groups is shown in Table 1.

Culture positive UTI was found in 149(51.03%) diabetic patients. It was more common in age group 55 years and onwards that is 68.6%, followed by age less than or equal to 40 years that is 52.8%. It was least common in age group 41-55 years and is 42.9%. Frequency of UTI varied significantly across age groups with p=0.006. (Table 2) Distribution of bacteria in patients having urinary tract infection showed that E.coli was found in majority of cases that is 113(75.80%), followed by P.aeruginosa in 108(72.5%), Proteus in 104(69.8%), and S.aureus in 101(67.8%) patients.

Among the different age group E.coli was more common more common in age group 55 years and onwards and that is 85.7%, followed by age group 41-55 years and that is 82.5%. It was least common in age group less than or equal to 40 years and is 63.2%. The difference was found to be statistically significant with p=0.01. There was also slight variation in frequency of other species namely Proteus, P.aereginosa and S.aureus among different age groups but the difference was not statistically significant with p>0.05. Table 2

In female, UTI was relatively common compared to males (53% vs. 47%) with p>0.05. Similary frequency of causal bacteria in females i.e., E.coli (52.2% vs.

Table 2: Age wise distribution of culture positive UTI and bacterial isolates

		Age (In Years)						Chi Square P value
		<= 40 years		41- 55 years		>=56 years		
		Count	%age	Count	%age	Count	%age	
Culture positive UTI	Yes	57	52.8%	57	42.9%	35	68.6%	0.006*
	No	51	47.2%	76	57.1%	16	31.4%	
E coli	Yes	36	63.2%	47	82.5%	30	85.7%	0.01*
	No	21	36.8%	10	17.5%	5	14.3%	
Proteus	Yes	36	63.2%	43	75.4%	25	71.4%	0.34
	No	21	36.8%	14	24.6%	10	28.6%	
P.aereginosa	Yes	41	71.9%	41	71.9%	26	74.3%	0.96
	No	16	28.1%	16	28.1%	9	25.7%	
S.aureus	Yes	36	63.2%	39	68.4%	26	74.3%	0.53
	No	21	36.8%	18	31.6%	9	25.7%	

* Significant at 95% level of significance

Table 3: Gender wise distribution of culture positive UTI and bacterial isolates

Micro organism	Male n=142	Female n=150	Chi Square P Value
Culture positive UTI			
Yes	70(47%)	79(53%)	0.64
No	72	71	
E.coli			
Yes	54(47.8%)	59(52.2%)	0.86
No	16	20	
Proteus			
Yes	51(49%)	53(51%)	0.55
No	19	26	
P.aeruginosa			
Yes	50(53.5%)	58(53.7%)	0.92
No	20	21	
S.aureus			
Yes	54(535%)	47(46.5%)	0.03*
No	16	32	

* Significant at 95% level of significance

DISCUSSION

This study shows the antibiotic sensitivity pattern of microbial species isolated from diabetic patients with community acquired UTIs in Khyber Teaching Hospital, Peshawar. The urinary tract is the principle site of the infection in diabetics with increased risk of complications[15]. Antibiotic resistance is an issue of major concern while treating infections caused by these organisms. The resistance to antibiotics has increased over the span of last many years. However, there is variation in resistance rates from country to country[16].

This study shows that majority (51%) of diabetic patients had UTI, which is in good agreement to the finding that has been reported by Tahir N, showing prevalence of UTI to be 43% in diabetic population in Pakistan[17].

In our study, UTI was more frequent in older age group (age 55 years or more) that is 68.6%. This is comparable to the finding reported by Mahesh et al, who in males showed an increased prevalence of UTI among the elderly age group, 51-60 (54.28%). Increasing frequency of prostate disease in males and diabetes mellitus are responsible for increasing the incidence of UTI in elderly patients[18].

In this study E.coli was found in majority of

Table 4: Antibiotic sensitivity of bacterial isoaltes

Antibiotic	Senitive (S) / Resistance (R)	E coli	Proteus	P.aereginosa	S.aureus
Sulbactam/ Cefoperzone (Sulzone)	S	60.2%	63.5%	65.7%	59.4%
	R	39.8%	36.5%	34.3%	40.6%
Augmentin	S	63.7%	57.7%	57.4%	63.4%
	R	36.3%	42.3%	42.6%	36.6%
Ciprofloxcin	S	69.0%	67.3%	68.5%	68.3%
	R	31.0%	32.7%	31.5%	31.7%
Ceftriaxone	S	63.7%	72.1%	67.6%	67.3%
	R	36.3%	27.9%	32.4%	32.7%
Gentamycin	S	67.3%	71.2%	76.9%	76.2%
	R	32.7%	28.8%	23.1%	23.8%

47.8%), Proteus (51% vs. 49%) and P.aeruginosa (53.7 vs. 46.3) was relatively common as compared to males with p>0.05. However, S.aureus was more common in males (53.5%) compared to females (46.5%) with p=0.03. Table 3

The antibiotic sensitivity and resistance pattern of Sulbactam/Cefoperzone (Sulzone), Augmentin, Ciprofloxacin, Ceftriaxone and Gentamycin is shown in Table 4. It shows that Gentamycin was most sensitive while Augmentin was most resistant in different microorganism.

cases that is 113(75.8%), followed by P.aeruginosa in 108(72.5%), Proteus in 104(69.8%), and S.aureus in 101(67.8%) patients. This finding is comparable to that of James A et al who reported E.coli (56.9%) to be most frequent urinary pathogen, whereas Klabsiella were 11.4%, Enterococcus spp. were 7.8%, P.mirabilis were 4.9%, S.aureus were 2.7%, and P.aeruginosa were 1.1%[19]. Also, Farrell DJ et al showed E.coli to be the predominant pathogen[20]. Similarly a Canadian study of outpatient urinary tract isolates reported that 84.1% of the isolates were E. coli, 3.8% were Klabsiella, 2.8%

were Enterococcus species, 2.6% were P.mirabilis, 0.7% were P.aeruginosa, and 0.4% were S.aureus[21].

According to our study UTI was relatively common in females compared to males (53% vs. 47%) with $p>0.05$. This finding is again in agreement with Mahesh et al[18] showing that UTI was high among the females (65%) than males (35%). In present study E.coli was most sensitive to Ciprofloxacin (69%%) > Gentamycin (67.3) > Augmentin and ceftriaxone (63.7%) > Sulbactam/Cefoperzone-Sulzone (60.2%). Again these results were comparable to study by Colodner R, showing that community-acquired gram-negative uropathogens remained highly susceptible to ciprofloxacin, cefuroxime and Augmentin with sensitivities of 94, 89 and 83% respectively[22]. Our finding is consistent with results of Daza R et al[23], his susceptibility studies showed that 37% E.coli strains were resistant to Augmentin; 33% to cotrimoxazole; and 22% to ciprofloxacin.

Both in community and hospital settings, antimicrobial resistance among uropathogens causing urinary tract infections is increasing[24]. Resistance rates among common uropathogens to commonly used antimicrobial agents have increased over the years, and theses resistance rates vary from country to country[25]. In view of paucity of data from Pakistan, we have attempted to throw some light on finding causative agents causing UTI in Diabetics, variation across gender and age groups and Antibiotics sensitivity and resistance patterns and comparing them with the available literature worldwide.

The main limitations of this study were; time period of study was short, specimens were sent to local hospital laboratory whose quality is not good; predisposing factors, co-morbidities and immune status of the patients; and previous antibiotics used were not taken into account.

CONCLUSION

Antibiotic therapy should only be advocated after culture and sensitivity. This would help in the proper treatment and would discourage the indiscriminate use of the antibiotics and prevent further development of drug resistance.

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