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STUDY OF COMMONLY ISOLATED UROPATHOGENS AND THEIR ANTIMICROBIAL PROFILE AT A TERTIARY CARE CENTER

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ABSTRACT

Background: Urinary tract infection is common in all age groups. It is more common in females, immunocompromised patients and those who have been catheterized or had some other invasive procedure of urinary tract. Gram negative and gram positive microorganisms are responsible for UTI. Sensitivity of uropathogens to antimicrobial drugs has changed over the past many years. **Objective**: The present study was planned to determine the common uropathogens, their antimicrobial sensitivity and clinical profile at a tertiary level health facility. **Material** & **Methods**: In this cross sectional study, urine samples of two hundred symptomatic patients were studied and the underlying pathogens were identified by appropriate methods. The present study was conducted from January 2019 to July 2019 in Nishtar Medical University and Hospital, Multan. Subsequently their sensitivity to antibiotics was determined by the recommended method. The data was entered and analyzed in SPSS 15. **Results**: Female patients were more than males. Increased frequency and dysuria were observed in all patients. E.coli was the commonest pathogen identified, followed by Klebsiella, Staphylococcus and Pseudomonas species. E.coli was sensitive to aminoglycosides, carbapenem and quinolones in decreasing order of frequency. Klebseilla and pseudomonas are sensitive to norfloxacin, whereas, staphylococcus are sensitive to quinolones. **Conclusion**: E.coli remains the most common uropathogen. Antimicrobial sensitivity of uropathogens showed a changing pattern.

KEYWORDS: Urinary tract infection, Antimicrobial sensitivity, Urinary tract anomalies, Uropathogens.

INTRODUCTION

Urinary tract infection (UTI) is one of the common infections in all age groups. Microorganisms causing UTI vary in different age groups. Urinary tract infection is more common in hospitalized patients, diabetics, females, and those having some underlying anatomical or physiological defect of urinary tract.[1] Recurrent UTI is also more common in women.[2] Previously gram negative microorganisms were considered the most common cause of UTI. This has changed over the past few years.[3,4,5] Changing microbial pattern may be the result of self-medication, haphazard use of antibiotics and lack of culture and sensitivity testing. Knowledge of common urinary pathogens and their antibiotic sensitivity or resistance is important for the effective and timely treatment of UTI on scientific basis. This is not always possible because of the lack of adequate laboratory facilities. At times antibiotics have to be started on empirical basis. It is always better to take urine sample for culture and sensitivity before starting antibiotics and change it after the result of laboratory test, if indicated. This practice may help in reducing the development of resistance to commonly used antibiotics. Adequate control of diabetes is helpful in reducing the occurrence of urinary infection in diabetics. In hospitalized patients observing strict aseptic measures during procedures on urinary tract is an effective way of preventing urinary tract infections. Observing good personal hygiene is also important in controlling urinary tract infection. Urinary tract infection has been the subject of different studies including those conducted in Pakistan. The present study was planned to know the common pathogens responsible for UTI in different age groups and their antibiotic sensitivity and clinical profile.

MATERIAL AND METHODS

This cross sectional study was conducted on 200 patients presenting to Nishtar Hospital, Multan, with symptoms and signs of UTI and referred for urine culture and sensitivity tests to Nishtar Hospital, Multan, from January 2019 to July 2019. Early morning midstream samples of urine were taken from each patient in a sterilized container. Initial physical, chemical and microscopic examination was performed on each sample of urine within half hour after receiving the sample. After that, each sample was inoculated on Cysteine Lactose Electrolyte Deficient (CLED) medium and incubated at 37 ^{0}C for 18 to 24 hours. The samples

showing fungal infection were inoculated on Sabourad Agar and incubated at 37 ^{0}C. Plates were examined for growth of microorganisms after 24 hours. Those having evidence of bacterial growth were examined physically, microscopically and chemically for microbial identification. Subcultures on blood and MacConkey agar were carried out for further evaluation of the pathogen. After microbial identification, the colonies were inoculated on nutrient agar and incubated at 37 ^{0} C for antimicrobial sensitivity testing by Kirby Bauer method. Results were interpreted according to guidelines.[2] Physical, chemical, microscopic and culture testing of urine samples was done by the recommended method.[2] White blood cell count (WBC) was done on venous blood sample by hematology analyzer. Presenting features of patients were also recorded. Data collection was done after informed written consent of patients and with the approval of institutional Ethical Committee. The data was entered and analyzed by SPSS version 15.

RESULTS

Majority of the patients had bacterial infection (97.5%). Fungal infection was seen in five patients (2.5%) who were known diabetics. Gram negative pathogens (88.5%) were more than gram positive (9%).

E.coli was the commonest bacterium (73%) responsible for UTI, followed by Klebsiella (8.5 %), Staphylococcus (7.5 %) and Pseudomonas species (05%) (Table I). Female patients (67.5%) were more than males (32.5 %). Majority of the patients were in 15-45 years age group (Table II). Increased frequency and dysuria were observed in all patients (Table III). E.coli was sensitive to aminoglycosides, carbapenem, piperacillin and quinolones in decreasing order of frequency (Table IV). It was found that Klebseilla, pseudomonas and proteus were sensitive to norfloxacin in majority of cases. It was noted that staphylococcus were sensitive to aminoglycosides and enterococcus quinolones in majority of the cases.

Table I: Frequency of pathogens in UTI (N=200).

Microorganism					
Gram negative	No (%)	**Gram positive**	No (%)	**Fungi**	No (%)
E. Coli	146(73)	Staphylococcus	15 (7.5)	Candida Albicans	**al** 05(2.5)
Klebseilla	17(8.5)				
Pseudomonas	10 (05)	Enterococcus	03(1.5)		
Acinetobacter	04 (02)		18 (09)		
Total	177(88.5)				05(2.5)

Table II: Demographic data of patients (N=200).

Age in years			Gender		Previous episodes of UTI			
<15	**15 -45**	**>45**	**Male**	**Female**	**Nil**	**1-3**	**>3**	**unknown**
70 (35)	105 (52.5)	25 (12.5)	65 (32.5)	135 (67.5)	110 (55)	55 (27.5)	85(42.5)	10 (05)

Table III: Presenting features and white blood cell counts of patients (N=200).

White blood cell count (× 10^3/µl)				Presenting features		
< 11	**10-15**	**16-20**	**>20**	**Frequency**	**Dysuria**	**Fever**
176	15	08	03	200 (100)	200(100)	70 (35)

Table IV: Sensitivity pattern of gram negative microorganisms (n=177).

Antibacterial agents	E. coli (%)	Klebsiella Spp. (%)	Pseudomonas Spp. (%)	Proteus Spp (%)
Cefotaxime	15	27	0	0
Co-amoxiclav	22	35	2 5	30
Ampicillin	07	12	0	18
Gentamycin	25	33	2 5	22
Amikacin	5 2	42	3 5	38
Cefipime	05	00	08	12
Lincomycin	07	22	0 0	00
Nitrofurantoin	25	30	2 8	23
Cloxacillin	03	00	05	02
Imipenim	45	00	0 0	00
Ciprofloxacin	08	05	0 0	00
Nalidixic acid	25	35	43	33
Norfloxacin	18	48	5 2	63
Levofloxacin	2 0	25	3 2	00
Meropenim	43	00	35	45
Pipracillin	32	00	3 7	42

Table V: Sensitivity pattern of gram positive isolates (n= 18).

Antimicrobial	Staphylococcus (%)	Enterococcus (%)
Vancomycin	49	25
Erythromycin	10	55
Ampicillin	0	0
Gentamycin	40	24
Amikacin	68	0
CeafopimeFP	32	0
Nitrofurantoin	0	58
Imipepenim	53	0
Ciprofloxacin	45	10
Norfloxacin	22	57
Cefotaxime	25	0

DISCUSSION

Urine is one of the most common samples taken from patients presenting with features of UTI for microbiological study in a clinical laboratory. Gram negative rods have been the most common microorganisms encountered in UTI, especially E coli and Klebsiella species among 217 uropathogens isolates from patients with UTI.[6] In another study, Klebsiella was more prevalent than E coil.[7] In a study, conducted on pregnant females, different pathogens isolated were Escherichia coli, Pseudomonas species, Klebsiella species, Proteus species, Staphylococcus and Citrobacter species. Any correlation of symptoms with pathogens of UTI was not found in that study.[8] In the present study, symptoms correlated positively with the degree of severity and acuteness of infection. Moreover, frequency, dysuria and fever were the most common presenting features in younger patients with acute UTI. However, fever was not seen in older patients and those with chronic UTI. Moreover, leukocytosis was observed in acute UTI, both in younger and older patients. Escherichia coli, Klebsiella, Proteus, Staphylococcus and Pseudomonas were common pathogens responsible for UTI in children in a study conducted on 100 patients,[9] however, leukocytosis was not studied. Congenital urinary tract anomalies were found in a prospective study conducted on 82 children.[10] Our study did not focus upon urinary tract anomalies. Escherichia Coli and Klebsiella were the commonest uropathogens, followed by Proteus mirabilis, Enterobacter and Staphylococcus aureus. Maximum sensitivity of pathogens was seen to co-amoxiclav, cephalosporin, aminoglycosides and quinolones. The microorganisms were resistant to ampicillin, amoxicillin and Nalidixic acid with low level resistance to cephalosporin, quinolones and aminoglycosides.[11] our findings were slightly different from this, however, low sensitivity patterns were observed for E. coli to commonly used antibiotics (quinolones) as compared to aminoglycosides, cotrimoxazole and cephalosporins. Escherichia coli (E.coli) was the most common isolate, followed by Klebsiella pneumonie and Pseudomonas Aeruginosa with variable sensitivity to the commonly used antibiotics with a decreasing susceptibility of uropathogens to flouroquinolones.[12] Our findings regarding spectrum and antibiotic sensitivity of microorganisms were not much different from this. Pseudomonas Aeruginosa and other gram negative microorganisms were the commonest microorganisms responsible for catheter associated UTIs during the year 1989-2000 while Enterococcus faecalis and other gram-positive microorganisms were predominant during 2001-02. A change in the spectrum of uropathogens was observed over a period of two years in catheter associated UTI.[5] E. coli and Klebsiella were also the most common microorganisms causing UTI in a community based study. The other pathogens diagnosed in this study included Pseudomonas aeroginosa, Enterobacter species, Enterococcus, Proteus Mirabillus, Staphylococcus aureus and Staphylococcus saprophyticus. Increasing trend of resistance to antibiotics such as Gentamicin, Amikacin, Ofloxacin, Cefotaxime and Ceftazidime was observed.[13] Quinolone resistance observed in our study was similar to these findings. However, sensitivity to aminoglycosides was more in the present study. Fever, dysuria and failure to thrive were the common presenting features in children less than three years old with UTI, studied over a period of three years.[14] Findings of the present study are in accordance with this regarding symptoms and signs, except that leukocytosis was not studied. A high rate of resistance to commonly used antibiotics was seen in catheter associated urinary tract infections in an Indian study. Fever and dysuria were the most common presenting features in these patients.[15] Our findings in catheterized patients or those with previous history of catheterization are in accordance with the findings of Indian study. In a prior study Escherichia coli was the predominant organism followed by Klebsiella species. It was resistant to commonly prescribed oral antibiotics and sensitive to trimethoprim-sulfamethoxazole and nitrofurantoin.[16] Sensitivity to cotrimoxazole was observed in the present study. This is encouraging for those who do not afford costly antibiotics.

CONCLUSION

E.coli remains the most common uropathogen. Antimicrobial sensitivity of uropathogens showed a changing pattern.

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