

Antibiotic Resistance Pattern of Uropathogen in patient with Chronic Kidney Disease

MUHAMMAD NADEEM, MUHAMMAD NAVEED ASLAM, UMAR FAROOQ QURESHI

ABSTRACT

Background: Chronic kidney disease is one of the most common problems in southern Punjab. On average 20 patients presented in outpatient department daily. Most of this patient suffered from diabetes mellitus and other chronic disease like hypertension. Now around half of patients belong to young age. Repeated urinary tract infection is one of the leading causes of rapid deterioration of renal function. So it is important to study the resistance pattern of uropathogens.

Aim: To study the frequency of antibiotic resistance of uropathogens in ch. kidney disease patients.

Place of study: Nephrology Department, Multan medical and dental college, Multan.

Methods: Two hundred and twenty patients with chronic kidney disease meeting the inclusion and exclusion criteria and attending the outpatient department and inpatient were included in the study after taking informed consent. Every patient was evaluated for presence of uropathogens resistance against antibiotic in their urine specimen.

Results: In our study number of uropathogens identified among these E. coli was the predominant isolate making up 63.6% and this was followed by Klebsella 18%. These uropathogens found to be resistant to multiple drugs and resistance reached upto 90% for certain drugs.

Conclusion: Multidrug resistant uropathogens are common in patients of chronic kidney disease.

Keywords: Chronic kidney disease, Uropathogens, Antibiotic resistance.

INTRODUCTION

Urinary tract infection (UTI) is most common and sometimes serious infection in chronic kidney disease (CKD) patients¹. It is one of the major causes of morbidity and mortality in CKD population. UTI is also the major cause of acute on chronic renal failure in CKD population. Among the bacterial infection, E.coli is the most common pathogen accounting about 80% of cases².

CKD is defined as "Either kidney damage or GFR of less than 60 mL/min/1.73m² of body surface area lasting for long than 3 months"³. There are 5 stages of CKD. CKD-1, when glomerular filtration rate (GFR) is more than 89ml/min with evidence of renal damage. CKD-2 when GFR is from 60 to 89ml/min. CKD-3 when GFR is from 30 to 59ml/min. CKD-4 when GFR from 15 to 29ml/min. CKD-5 when GFR is less than 15ml/min. CKD is widely prevalent condition and is associated with a wide range of adverse effects⁴. Decreased immunity is one of them. So UTI is more common in CKD population.

UTI is an infection in any part of urinary system, kidneys, ureters, bladder and/or urethra. Most infections involve the lower urinary tract, the bladder and the urethra. Women are at greater risk of developing a UTI than men. The most common symptoms are burning micturition and urgency⁵.

These symptoms may vary from mild to severe⁶https://en.wikipedia.org/wiki/Urinary_tract_infection - cite_note-EM2011-3 and in healthy women last an average of six days. Some pain above the pubic bone or in the lower back may be present. People experiencing an upper urinary tract infection, or pyelonephritis, may experience flank pain, fever, or nausea and vomiting in addition to the classic symptoms of a lower urinary tract infection⁵. Rarely the urine may appear bloody⁷https://en.wikipedia.org/wiki/Urinary_tract_infection - cite_note-Sal2011-5 or contain visible pus in the urine⁸. Subjects were considered to have a culture-confirmed urinary tract infection if they had $\geq 10^2$ colony-forming units of uropathogen per milliliter of midstream urine⁹. Antibiotics are usually given empirically before the laboratory results of urine culture are available. To start the proper treatment, recent knowledge of the organisms that cause UTI and their antibiotic susceptibility is necessary.

MATERIALS AND METHODS

This study was carried out at nephrology department of Ibn-e-Sina Hospital Multan. All new patients fulfilling the inclusion and exclusion criteria, admitted with chronic kidney disease between April 2012 and March 2015 were included. After ethical board review from hospital ethical committee, patient's data were

Department of Nephrology, Multan Medical & Dental College
Correspondence to Dr. Muhammad Nadeem, Assistant Professor

kept on a designed Performa. Urine samples were collected, all of the samples were midstream. Culture was done by the calibrated loop technique delivering 0.001 mL of urine and plated on Cysteine-Lactose-Electrolyte Deficient (CLED) agar plates. For gram-negative bacilli more than 10⁵ colonies per mL of urine, whereas for gram-positive cocci 10³-10⁵ colonies per mL were considered significant. Their age limit was 18 years to 80 years.

SPSS 19.0 was used for statistical analysis. Descriptive statistics used to calculate mean and Standard deviation for Age. The qualitative data like demographics (sex; male or female), microorganisms, and drug resistance will be presented as frequency and percentages. Chi Square test used to compare the frequency and P value of ≤ 0.05 will be considered significant

RESULTS

Two hundred and twenty patients were included in the study. The mean age was 52.14±15.77Sd with minimum age of 18 and maximum of 80 yrs (Table 1). When patients were divided according to age groups most of these patients were between 51-60 years as shown in Table 2. There were 1:1.1 male to female ratios (Fig 1). E.coli was predominant isolate making up 63.6% and this was followed by Klebsela 18%.

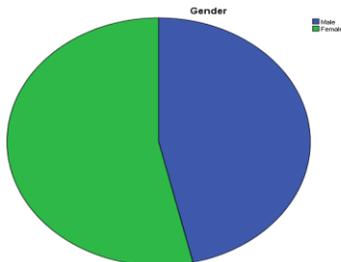
Table 1: Descriptive statistics for Age

Minimum	Maximum	Mean	Std. Deviation
18	80	52.14	15.77

Table2: Distribution according to age groups

Age Distribution	Frequency	%age
51-60	56	25
61-70	46	21
41-50	45	20
18-30	31	14
31-40	23	11
71-80	19	9

Fig 1: Gender distribution



When the E Coli and Klebsiella were assessed for multidrug resistance (MDR).It was found that highest resistance was found against Ampicillin with P value of .007 and .002 in E Coli and Klebsiella respectively shown in table 3,4. While least against Nitrofurantoin with P value of 0.00 for E Coli and Klebsiella.

Table 3 Resistance pattern for E Coli (n=140)

Antibiotics	Frequency	%age	P Value
Ampicillin	99	70	.007
Amoxicillin – Clavulanic Acid	91	65	.63
Amikacin	16	10	.28
Cefepime	17	12	.88
Cefixime	87	62	.05
Cetriaxone	76	54	.4
Ceftazidime	31	22	.35
Cefoperazone-Sulbactam	3	2.1	.23
Ciprofloxacin	83	59	.008
Fosfomycin	6	4.2	.01
Genatmicin	46	32	.14
Imepenem	5	3.5	.88
Levofloxacin	30	21	.51
Linezolid	4	2.8	.42
Meropenem	4	2.8	.47
Moxifloxacin	14	10	.51
Nitrofurantoin	22	16	.00
Norfloxacin	22	16	.55
Sepran	72	51	.88
Tetracyclin	43	31	.75
Tazocin	8	5.7	.53
Aztreonam	14	10	.85

Table 4 Resistance pattern for Klebsiella (n=39)

Antibiotics	Frequency	%age	P Value
Ampicillin	37	94	.002
Amoxicillin – Clavulanic Acid	25	64	.61
Amikacin	7	17	.29
Cefepime	17	27	.88
Cefixime	19	48	.07
Cetriaxone	23	58	.39
Ceftazidime	13	33	.37
Cefoperazone-Sulbactam	3	7.6	.3
Ciprofloxacin	13	33	.01
Fosfomycin	7	17	.02
Genatmicin	12	30	.13
Imepenem	2	5	.86
Levofloxacin	6	15	.51
Meropenem	2	5	.46
Moxifloxacin	2	5	.48
Nitrofurantoin	18	46	.00
Norfloxacin	8	20	.57
Sepran	19	48	.88
Tetracyclin	10	25	.74
Tazocin	3	7.6	.53
Aztreonam	4	10	.85

When age groups stratification for organisms was performed.It showed that highest number of Multidrug resistant organism was found in age group 51-60 although P value was not significant. The organism distribution among male and female found that highest number found in females with P value.00 (Table 5,6).

Table 5: Distribution According to Age Group

Age (years)	E Coli		Klebsiella	
	Frequency	%age	Frequency	%age
18-30	17	12	8	20
31-40	14	10	4	10
41-50	30	21	7	17
51-60	33	23	13	33
61-70	31	22	6	15
71-80	15	10	1	2

Table 6: Distribution According to Gender P value (0.00)

Gender	E Coli		Klebsiella	
	Frequency	%age	Frequency	%age
Male	59	42	16	42
Female	81	58	23	58

DISCUSSION

Urinary tract infection (UTI) is one of most common health problem all over the world, approximately 150 million people worldwide every year suffered from UTI¹⁰. Infection rate seems to be common in those patients suffering from chronic kidney disease. There are number of other factors leading to UTI like catheterization. UTI is common in Asia as in Bangladesh, has been reported to affect all age groups of individuals, both hospitalized patients and outpatients¹¹.

In our study the age range is wide as number of patients present in early age with mean age of 52 ± 15.7 Sd. Although the highest number found in age group 51-60 years. In the study the most common isolated organism was E Coli followed by Klebsiella. These results are comparable with one of the study from Delhi, where they found that E.coli was the commonest isolated organism followed by Klebsiella, S. aureus, Proteus species and Pseudomonas aeruginosa¹². While in study by Bajaj Klebsiella was the commonest organism followed by E.coli, P.aeruginosa and S.aureus in both Inpatient and outpatient departments¹³.

In other study when the prevalence of UTI in children was studied the most common organism was Pseudomonas, Acinetobacter and Enterococcus while low prevalence of E.coli¹⁴.

In our study the females suffered from UTI with Multidrug Resistant organisms more commonly than males. The occurrence of antibiotic-resistant pathogens at a higher frequency in females than in males seems to be due to the fact that females are more susceptible to UTI because of their anatomy than males, irrespective of other causes^{15,16}. Our study showing that multidrug resistant organisms were resistant to Ampicillin while sensitive to nitrofurantoin. Such high incidence of resistance was consistent with studies from other parts of Asia, as shown in Indian study by Gupta et al¹⁷ reported 76% resistance to E. Coli isolates for ampicillin. Another

study from Karnataka reported a resistancerate of 80.6% for ampicillin¹⁸. So our study showing that Escherichia coli is still the most frequent MDR organism in both inpatient and outpatient groups. Resistance is quite high against Ampicillin and other conventional groups. This shows that the usual practice of prescribing drugs without culture and sensitivity needs to be addressed.

CONCLUSION

E coli is the most common multidrug resistant organism in patients of chronic kidney disease inpatient and outpatients departments.

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