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Original Research Article

# Bacteriology and Antibiogram of Urinary Tract Infection of Chronic Renal Failure Patients Taking Hemodialysis at Tertiary Care Centre

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## Abstract

The aim of our study is to assess the frequency of urinary tract infections in clean catch midstream urine, to isolate the urinary tract infection causing organism and their anti microbial sensitivity to various antibiotics in chronic renal failure patients undergoing hemodialysis. Our study was carried out in the time span of 12 months from January 2018 to December 2018 at GMERS Medical College Gandhinagar, Gujarat. The study included 1225 patients of all age group who had clinically evident chronic renal failure and taking hemodialysis. Out of 1225 patients presented clinically as chronic renal failure and taking hemodialysis, 365(29.80%) patients were culture positive and 860(70.20%) patients were culture negative. Out of 1225 patients of CRF taking hemodialysis 891(72.73%) were male and 334(27.27%) were female. In the present study maximum number of patients 97 were from age group 61-70 years followed by 57 patients from 21-30 years age group. Out of 365 cultures positive isolates 301(82.47%) were gram negative isolates and 64(17.53%) were gram positive isolates. Both gram negative and gram positive isolates are 100% sensitive to imipenam and least sensitive to amoxicillin 15.28% and 10.94% respectively. MDR in gram negative isolates were 19.27% and in gram positive isolates were 12.69%. our study is helpful in need for continous evaluation of local antibiotics sensitivity patterns for the formulation of rational antibiotic policy which will reduces further spread of antimicrobial resistance.
**Keywords**: Chronic renal failure, Hemodialysis, Urinary tract infection.



## INTRODUCTION

The life of patients with chronic renal failure can be prolonged with the advent of hemodialysis [1]. But, it is widely recognized that infections at different sites are the most serious hazard and responsible for increased morbidity and mortality in chronic renal failure [2-4]. Chronic renal failure is more common among male gender as compare to female gender due to diabetes hypertension alcoholism and stress. In CRF patients urinary tract infections are more common due to urine stagnation and absence of flushing action [5]. The aim of our study is to assess the frequency of urinary tract infections in clean catch midstream urine, to isolate the urinary tract infection causing organism and their anti microbial sensitivity to various antibiotics in chronic renal failure patients undergoing hemodialysis. As urinary tract infections start with minimal or some non specific symptoms, so early diagnosis is not easy. On the other part delayed treatment until recognition of signs and symptoms significantly increases the life risk [6].

## MATERIALS AND METHODS

Our study was carried out in the time span of 12 months from January 2018 to December 2018 at GMERS Medical College Gandhinagar, Gujarat. The study included 1225 patients of all age group who had clinically evident chronic renal failure and taking hemodialysis. From all the 1225 patients mid stream clean catch urine sample was collected in sterile wide mouth urine collection container and transported to the laboratory according to standard protocol. All the samples were inoculated on Blood agar and Mac-Conkey agar and incubated at 37°c for 24 hours [7]. Later identification of microorganism was done by using various biochemical tests and and anti microbial sensitivity testing was done by Kirby-Bauer disc diffusion method as recommended by CLSI [8].

In our study the diagnosis of urinary tract infection was stamped by the presence of bacteriuria ($10^5$organism/ml) in at least three clean voided urine collections with the same species observed.

## RESULTS AND DISCUSSION

Out of 1225 patients presented clinically as chronic renal failure and taking hemodialysis, 365(29.80%) patients were culture positive and 860(70.20%) patients were culture negative. Our culture positive rate is well correlated with with study of Jaishwal *et al*., (30%) [9], Mohsin R. *et al.*, (35.5%) [10] and Dhakal *et al*., (25.16) [11].

Out of 1225 patients of CRF taking hemodialysis 891(72.73%) were male and 334(27.27%) were female. Chronic kidney disease is a common problem among males compared to females due to stress, alcoholism, diabetes and hypertension [5]. In the present study maximum number of patients 97 were from age group 61-70 years followed by 57 patients from 21-30 years age group. Least significant rate was observed in above 71 years age group. Chronic kidney disease is more common in elder people with urinary tract infections [12].

**Table-1: Bacterial Isolates**

| Isolated Organism | Frequency | Percentage |
|---|---|---|
| **Gram Negative Bacteria** | | |
| Escherichia coli | 127 | 34.79 |
| Proteus Vulgaris | 58 | 15.89 |
| Pseudomonas aerusinosa | 25 | 6.85 |
| Klebsiella oxytoca | 25 | 6.85 |
| Proteus Mirabilis | 23 | 6.30 |
| Enterobacter aerogens | 15 | 4.11 |
| Providensia spp. | 14 | 3.84 |
| Klebsiella pneumoniae | 14 | 3.84 |
| **Gram Positive Bacteria** | | |
| Staphylococcus saprophyticus | 51 | 13.97 |
| Staphylococcus aureus | 13 | 3.56 |
| **Total** | 365 | 100 |

Out of 365 culture positive isolates 301 (82.47%) were gram negative isolates and 64(17.53%) were gram positive isolates which is well correlated with other studies [13-15]. Other organism like Pseudomonas aerusinosa (6.85%), Klebsiella oxytoca (6.85%), Proteus Mirabilis (6.30%), Enterobacter aerogens (4.11%), Providensia spp. (3.84%), Klebsiella pneumonia (3.84%) were also isolated. Among gram negative isolates e.coli (34.79%) was the commonest isolates followed by Proteus vulgaris (15.89%). Among gram positive isolates Staphylococcus saprophyticus (13.97%) followed by Staphylococcus aureus (3.56%)

**Table-2: Antibiotic susceptibility pattern of Gram negative bacterial isolates**

| Antibiotics | Antibiotic Suseptibility Pattern | |
|---|---|---|
| | Sensitive n (%) | Resistant n (%) |
| Imipenam | 301(100) | 0(0) |
| Gentamicin | 283(94.10) | 18(5.90) |
| Nitrofurantoin | 154(51.16) | 147(48.84) |
| Amoxicillin clavulinic acid | 152(50.50) | 149(49.50) |
| Cotrimoxazole | 144(47.84) | 157(52.16) |
| Chloremphenicol | 139(46.18) | 162(53.82) |
| Norfloxacin | 132(43.85) | 169(56.15) |
| Ceftriaxone | 121(40.20) | 180(59.80) |
| Cephalexin | 99(32.89) | 202(67.11) |
| Amoxycillin | 46(15.28 ) | 255(84.72) |

In present study gram negative organisms shows 100% sensitivity to imipenam followed by Gentamicin (94.10%), Nitrofurantoin (51.16%), Amoxicillin clavulinic acid (50.50%), Cotrimoxazole (47.84%), Chloremphenicol (46.18%), Norfloxacin (43.85%), Ceftriaxone (40.20%), Cephalexin (32.89%), Amoxycillin (15.28%). Our findings are well correlated with findings of Richa *et al*., [5] and Falah *et al*., [16]

**Table-3: Antibiotic susceptibility pattern of Gram positive bacterial isolates**

| Antibiotics | Antibiotic Suseptibility Pattern | |
|---|---|---|
| | Sensitive n (%) | Resistant n (%) |
| Imipenam | 64(100) | 0(0) |
| Gentamicin | 55(85.93) | 9(14.07) |
| Nitrofurantoin | 32(50.00) | 32(50.00) |
| Amoxicillin clavulinic acid | 52(81.25) | 12(18.75) |
| Cotrimoxazole | 51(79.69) | 13(20.31) |
| Chloremphenicol | 47(73.44) | 17(26.56) |
| Norfloxacin | 44(68.75) | 20(31.25) |
| Ceftriaxone | 25(39.06) | 39(60.94) |
| Oxacillin | 56(87.50) | 8(12.50) |
| Amoxycillin | 7(10.94) | 57(89.06) |

Gram positive isolates were showed 100% sensitivity to imipenam and least sensitive to amoxicillin (10.945) which is well correlated with study of Richa *et al*., [5].

**Table-4: Multi drug resistant isolates distribution**

| Isolated Organism | Freuency (%) | MDR isolates |
|---|---|---|
| **Gram Negative Bacteria** | | |
| Escherichia coli | 127(34.79) | 33(25.98) |
| Proteus Vulgaris | 58(15.89) | 12(20.69) |
| Pseudomonas aerusinosa | 25(6.85) | 4(16) |
| Klebsiella oxytoca | 25(6.85) | 3(12) |
| Proteus Mirabilis | 23(6.30) | 3(13.04) |
| Enterobacter aerogens | 15(4.11) | 1(6.66) |
| Providensia spp. | 14(3.84) | 2(14.29) |
| Klebsiella pneumoniae | 14(3.84) | 0 |
| **Gram Positive Bacteria** | | |
| Staphylococcus saprophyticus | 51(13.97) | 6(11.76) |
| Staphylococcus aureus | 13(3.56) | 2(15.38) |
| **Total** | 365 | 66(18.08) |

Infection by Multi drug resistance organism often leads to increase rate of death [17].Among 365 isolates 66(18.08%) isolates were showed resistant towards more than two group of antibiotics means they were MDR. MDR in gram negative isolates were 19.27% and in gram positive isolates were 12.69%.

Patients of chronic renal failure on hemodialysis are prone to repeated infections which leads to frequent use of antibiotics in them and increased resistant than normal people [18, 19].

## CONCLUSION

Frequent examination of urine for bacteriuria would helpful for early detection of urinary tract infections which is useful for reduction of morbidity and mortality in hemodialysis patients. E.coli is the predominat isolate in culture as well as MDR isolate too. In both gram positive and gram negative bacteria imipenem is the most effective antibiotic.

Our study is helpful in need for continuous evaluation of local antibiotics sensitivity patterns for the formulation of rational antibiotic policy which will reduces further spread of antimicrobial resistance.

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