



Antimicrobial susceptibility pattern of urinary tract isolates of citrobacter species in a tertiary care hospital

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Abstract

Introduction: The genus *Citrobacter* is a distinct group of aerobic Gram-negative bacilli from the Enterobacteriaceae family. It is an opportunistic pathogen that can cause diarrhea, septicemia, meningitis, urinary tract and respiratory system infection. Its isolation in the hospital settings is increasing. It is a present challenge to the clinical microbiologist because of their increased occurrence in nosocomial infection.

Objectives: The current study was done to find out the prevalence and antibiotic susceptibility pattern of *Citrobacter* species from urinary tract isolates.

Materials and Methods: Urine samples received from January 2013 to December 2013 were considered. A total of 9186 urine samples were considered, out of which 6381 were sterile and 2805 plates had growth. 65 (2.312%) of the growth plates had *Citrobacter* species growth. *Citrobacter* species were identified by conventional biochemical method. Antibiotic sensitivity test was performed by Kirby-Bauer Disc diffusion method.

Results: Out of 65 patients female: male ratio was 17:15.5. The age groups were 0-9 years; 8 patients (12.3%), 10-19 years; 3 patients (4.615%), 20-29 years; 11 patients (16.9%), 30-39 years; 6 patients (9.28%), 40-49 years; 12 patients (18.46%), 50-59 years; 5 patients (7.69%), ≥60 years; 20 patients (30.76%). The effective agent against *Citrobacter* species was found to be Imipenem (90.76%) then Cefoperazone-Sulbactam (89.23%) followed by Piperacillin-Tazobactam and Amikacin (87.69%). 6 Multidrug resistant strains and 8 were ESBL producers.

Conclusion: From the study it was seen that multidrug resistant strains are emerging. Proper surveillance in the antimicrobial sensitivity of *Citrobacter* was required. The age group 60 and above was found in majority to have culture positive *Citrobacter* spp. Depending on antibiotic sensitivity pattern of *Citrobacter* isolates, the antibiotics should be used. Proper infection control measures should be taken to prevent the spread of the pathogen.

Keywords: Antibiotic Susceptibility, *Citrobacter* Spp, Multi-Drug Resistant Bacteria, Urinary Tract Infections.

1. Introduction

Urinary tract infection (UTI) continues to be the commonest nosocomial infection according for approximately 40% of all hospital acquired infections and it is one of the most important causes of morbidity and mortality (Basavaraj C et al; 2013). Urinary tract infection (UTI) is the third most common infection experienced by humans after respiratory and gastro-intestinal infections. UTI may be defined as a condition in which bacteria are established and multiplying within the urinary tract. Diagnosis requires demonstration of bacteriuria. Exceptions to this include patients with pyogenic abscess of kidney or perinephric tissue, obstructed pyelonephritis or bacterial prostatitis in whom the urine may be sterile (Barton et al; 1982).

The genus *Citrobacter* is a distinct group of aerobic Gram-negative bacilli from the Enterobacteriaceae family (Najar M.S et al; 2009). It is an opportunistic pathogen that can cause diarrhea, septicemia, meningitis, and urinary tract and respiratory system infection (Metri BC et al; 2011). *Citrobacter* isolates were found

to be the third most common organism causing UTI in hospitalized patients after *Escherichia coli* and *Klebsiella* species accounting to 9.4% of all isolates (Lipsky BA et al; 1980). It is a present challenge to the clinical microbiologist because of their increased occurrence in nosocomial infection.

The aim of the present study was to find out of prevalence and antibiotic sensitivity pattern of *Citrobacter* spp in patients admitted to or attending outpatient Departments with history of urinary tract infections in a tertiary care hospital.

2. Materials and methods

Urine samples received from January 2013 to December 2013 from Kasturba hospital, Manipal were included in the study. A total of 9186 urine samples were included in the study, out of which 6381 were sterile and 2805 plates had growth. Identification was by done using standard microbiological techniques. (Murray PR et al ;2005).



Antibiotic susceptibility test was performed by Kirby-Bauer Disc diffusion method. Test strains were pre-incubated in peptone water at 37°C at an optical density of 0.5Mc Farland standard. This suspension was used to inoculate the strains onto the Muller Hinton agar plate by swabbing them with a sterile cotton swab and performing lawn culture as recommended by clinical and laboratory standards institute (Wayne,PA ;2005)

The antibiotic discs used for sensitivity testing were obtained from Hi –Media,Mumbai,India and the following antibiotics were used. Amikacin (30µg), Ampicillin(10µg),Ceftriaxone(30 µg),Amoxicillin-Clavulanic acid(20/10 µg)Cefuroxime(30 µg),Cotrimoxazole(1.25 µg/23.75 µg),Gentamicin(10 µg),

Netilmicin(30 µg),Norfloxacin(10 µg),Aztreonam(30 µg),Cefoperazone-Sulbactam(75/30µg),Cefipime(30 µg),Meropenem(10 µg) and Piperacillin-Tazobactam(100/10µg). 65(2.312%) of the growth plates had Citrobacter species growth.

3. Results

Out of 160 patients 34 were females (52.3%) and 31 were males (47.69%) (Fig1).

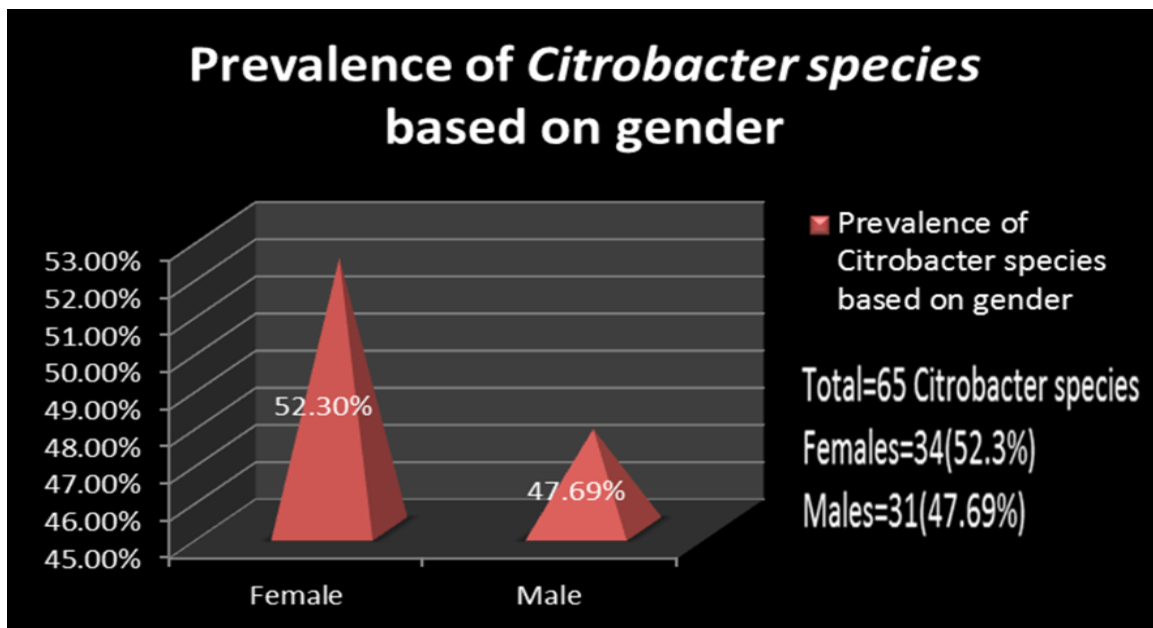


Fig. 1: Prevalence of Citrobacter Species Based on Gender

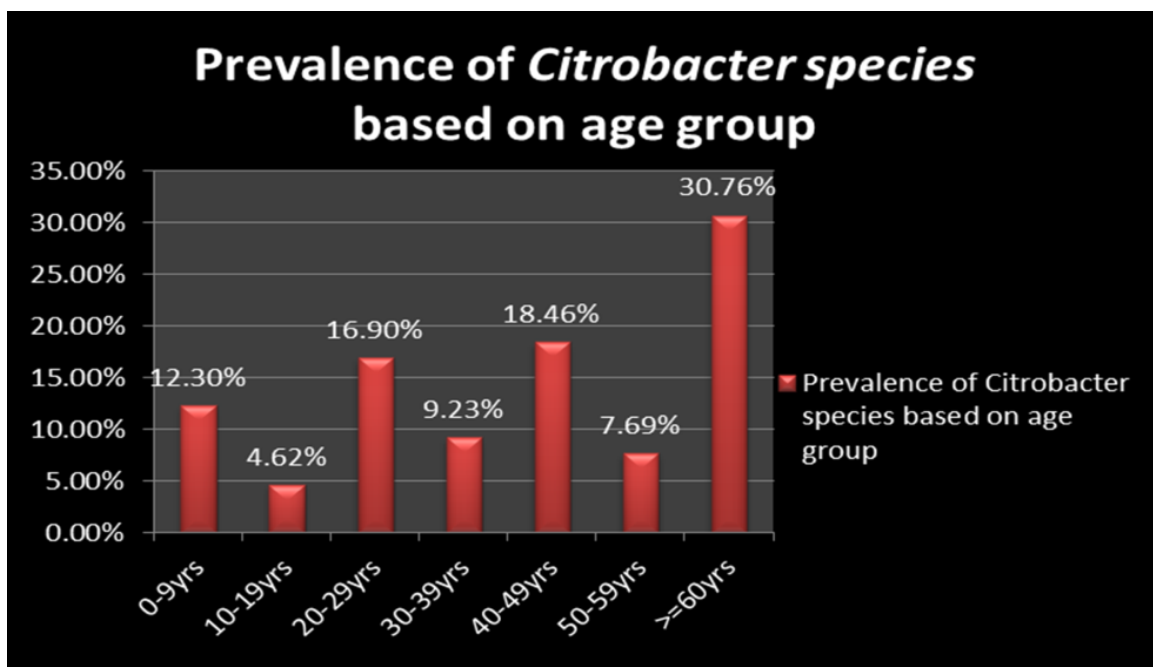


Fig. 2: Prevalence of Citrobacter Species Based on Age Groups

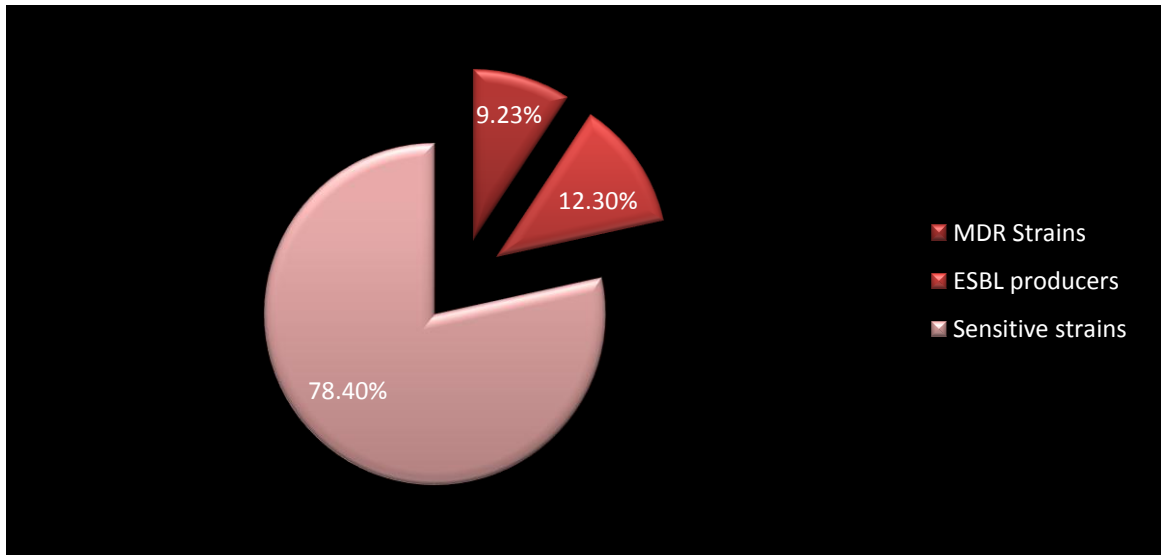


Fig. 3: Pie Chart was Showing Percentage of Sensitive and Resistant Strains.

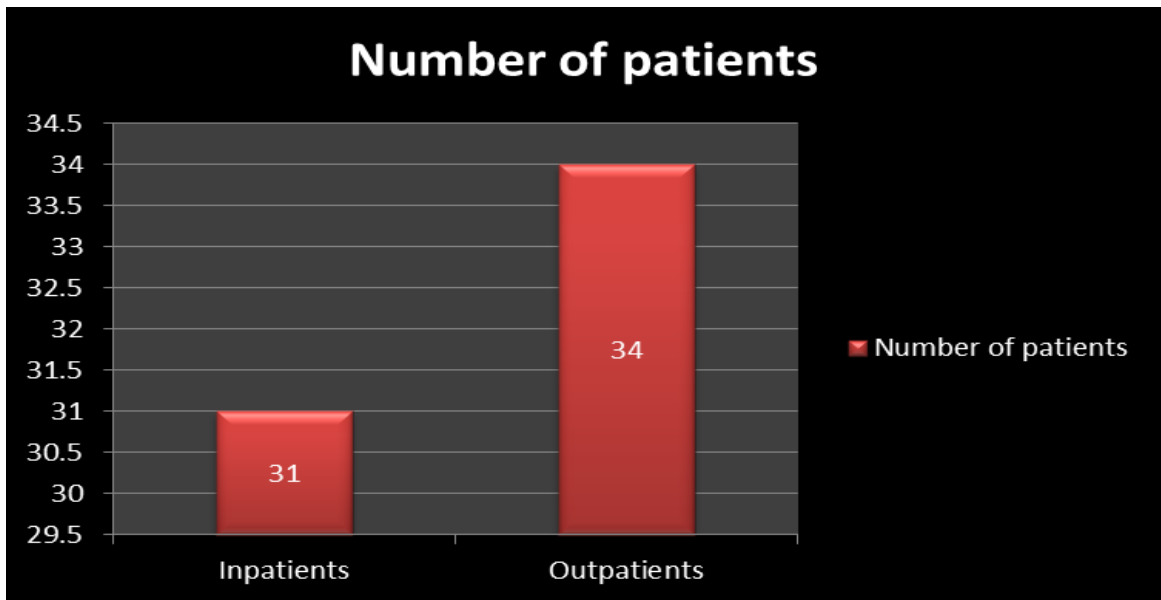


Fig. 4: Characterization of Patients Based on Number of Inpatients and Outpatients.

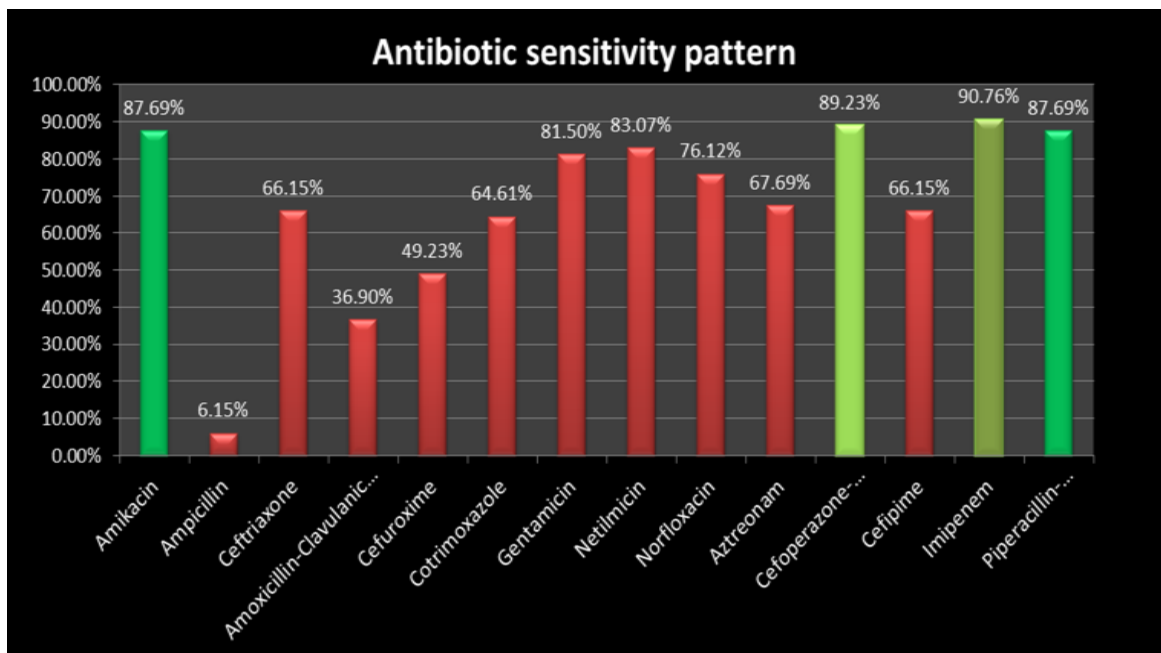


Fig. 5: Antibiotic Sensitivity Pattern of Citrobacter Species

The age groups were 0-9years; 8 patients(12.3%),10-19years; 3patients(4.615%), 20-29years;11patients (16.9%),30-39years;6patients(9.28%),40-49years;12 patients(18.46%),50-59years;5patients(7.69%),≥60years;20 patients(30.76%)(Fig:-2).

Out of the 65 strains 14 were found to be Multidrug resistant and 8 of which were ESBL producers. (Fig:-3) MDR (Multi drug resistant), ESBL (Extended spectrum beta lactamase).

The data was also studied under the parameter of inpatient and outpatient entry.31 patients were inpatients and 34 were out patients. (Fig4).

Depending upon the conventional biochemical method Citrobacter was speciated. Antibiotic sensitivity pattern of the following Citrobacter was found to be as follows.

4. Discussion

It was observed in other study that females were more prone to urinary tract than males, females 34(52.30%) and males 31(47.69%). Similar study conducted by (MY Tula et al; 2014) showed that females were suffering more than males in urinary tract infection. Citrobacter were emerging pathogens causing Urinary tract infection. Citrobacter was the leading cause of urinary tract infection (Samonis et al; 1991).There had been increase in the isolation of Citrobacter species (2.312%) when compared with the other similar study which was 0.8% (Rong Zhang et al; 2008). In our study we found that Citrobacter species isolates were almost equal in female patients and male in contrast to other study (Basavaraj et al; 2013). Earlier studies in the same hospital done by (Shobha K.L et al; 2007) had two strains out of ten strains producing ESBL. In the present study there were eight strains out of 65(12.30%).This showed that there was an increase in the ESBL strains of citrobacter species.Buddha Bahadur Basnet et al ;2013, in their study showed that all the citrobacter species isolated from urine species were multidrug resistant strains. In our study 8 strains out of 65 were multidrug resistant strains(12.90%).In a study conducted by (Ravindranath Misra et al;2012) reported 44.73% ESBL producers and had only four strains out of 114 multidrug resistant strains.

Susceptibility to Amikacin was 87.69% but study conducted by (Gandam Pavani; 2012) showed 100% susceptibility to Amikacin in contrast (K Ashish et al; 2012) showed only 25% susceptibility to Amikacin. Most effective agent against Citrobacter species was found to be Imipenem (90.76% sensitivity) followed by Cefoperazone-Sulbactam (89.23% sensitivite) when compared with other study where most effective drug was found to be Imipenem (91.8% sensitive) followed by Piperacillin-Tazobactam (58.3% sensitive) (Metri BC et al;2011). To conclude, we would like to bring notice to the fact that Citrobacter though not uncommon isolate is increasing with its multi-drug resistance and Extended Beta -lactamase producers. Proper surveillance in the antimicrobial sensitivity of Citrobacter is required. Depending on antibiotic sensitivity pattern of Citrobacter isolates the antibiotics should be used judiciously. Infection control measures should be taken to prevent the spread of the pathogen.

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