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# ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF ESBL PRODUCING GRAM NEGATIVE BACILLI

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## ABSTRACT

The production of extended-spectrum- β lactamases (ESBLs) is an important mechanism for resistance to the cephalosporins. The proper dectection of this enzyme is important for optimal patient care**.** The aim of this study is to determine the prevalence and the antibiotic sensitivity pattern of ESBL producing gram negative bacilli**.** All the urinary isolates were collected from patient suffering from urinary tract infections were tested for ESBL production by using both the double- disk approximation and the combination disk methods. Among the 218 strains collected from clinically diagnosed UTIs patient 144(66%) were ESBL producers including E.coli – 94(43%) Klebsiella spp – 24(11%), Pseudomonos aeroginosa – 14(0.6%), Citrobacter spp – 4(0.18%), Enterobacter spp – 6(0.27%),

**KEY WORDS: ESBL producing gram negative bacilli.urinary tract infections**

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# INTRODUCTION

Antimicrobial resistance is a growing threat worldwide. Resistance mechanisms have been found for every class of antibiotic agents. The predominant mechanism for resistance to the β-lactam antibiotics in gram-negative bacteria is the production of β-lactamase. The production of extended-spectrum β-lactamases (ESBLs) is an important mechanism which is responsible for the resistance to the third-generation cephalosporins. During the last 2 decades, ESBL Producing gram-negative bacilli have emerged as a major problem in many settings [1]. The ESBLs mediate resistance to broad-spectrum cephalosporins (e.g., ceftazidime, ceftriaxone and cefotaxime) and aztreonam. The problems which are associated with ESBLs include multidrug resistance, difficulty in detection and treatment, and increased mortality. Awareness and the detection of these enzymes are necessary for optimal patient care. The judicious use of antimicrobial agents and improved infection control methods must become health care priorities.

### *Aim & Objective*

The objective of the present study was to determine the prevalence and antibiotic sensitivity pattern of ESBL producing gram negative bacteria which were isolated from urine samples from both, inpatients and out-patients who attended SRM Medical College & Hospital.

# METHODS & MATERIALS

Urinary isolates from symptomatic UTI cases attending or admitted to the SRM Medical College & Hospital were identified by conventional methods. Antimicrobial susceptibility testing was done by *Kirby Bauer's* disc diffusion method. Isolates resistant to cephotaxime were tested for ESBL production by double disc synergy test method.ESBL detection by NCCLS (National committee for clinical laboratory standard) Phenotypic Method**:** NCCLS Phenotypic Confirmatory Test with ESBL production was detected using the Double-Disk Synergy (DDS) test. ESBL presence was assayed using the following antibiotic disks cefotaxime (30 µg), cefotaxime/clavulanic acid (30/10 µg), ceftazidime (30 µg) and ceftazidime/clavulanic acid (30/10 µg). . A $\geq$5mm increase in the zone of inhibition for the ceftazidime/clavulanic acid-containing disc versus the zone for the disc containing ceftazidime alone is considered confirmation of ESBL production.

# RESULTS

Out of 218 samples collected from clinically diagnosed UTIs patient 144(66%) were ESBL producers in that E.coli – 94(43%) Klebsiella spp – 24(11%), Pseudomonos aeroginosa – 14(0.6%), Citrobacter spp – 4(0.18%), Enterobacter spp – 6(0.27%),

Of these 22 was MDR GNB it includes E.coli – 10(45.5%) Klebsiella spp – 4(18%), Pseudomonos aeroginosa – 4(18%), Citrobacter spp – 2(0.9%), Enterobacter spp – 2(0.9%),Acinetobacter spp-2(0.9%)

**FIGURE 1**

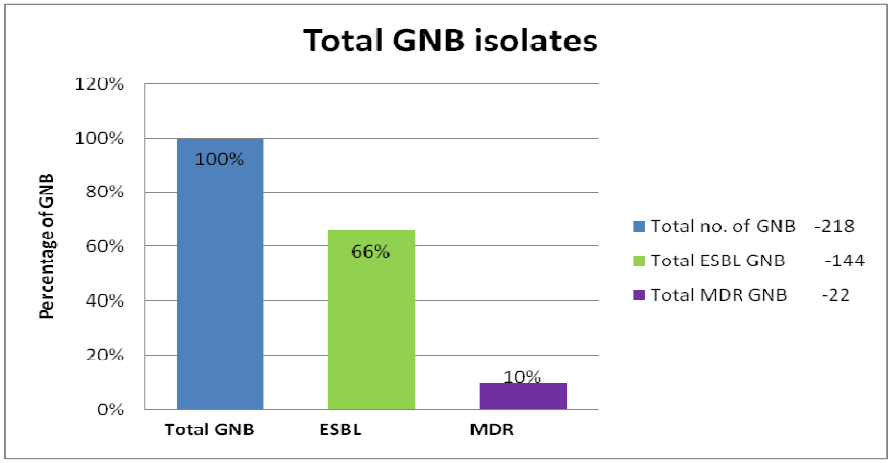


**FIGURE 2**

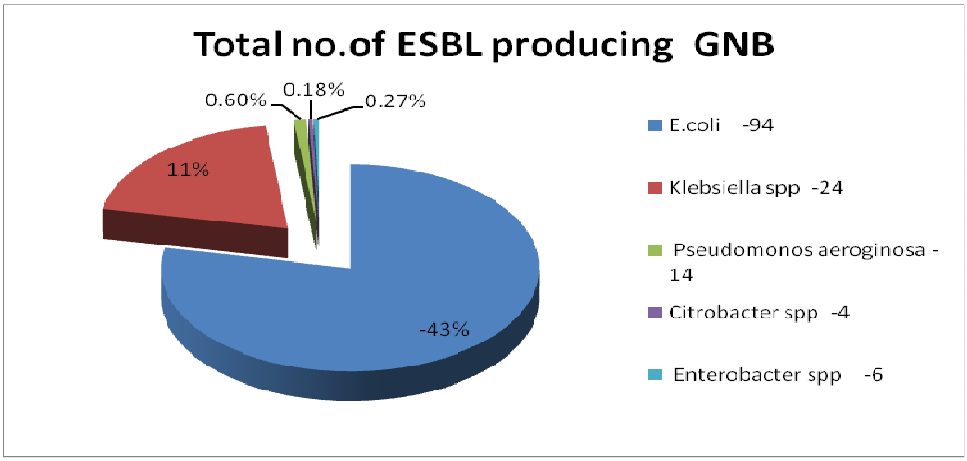


**FIGURE 3**

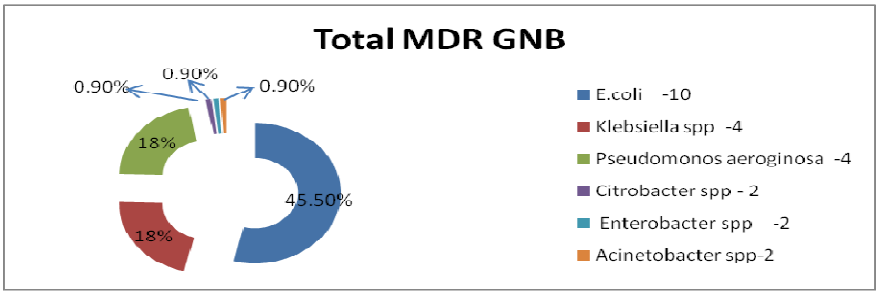


**FIGURE NO: 4 ESBL DETECTION**

**TABLE NO 1**
***Susceptibility Pattern of ESBL Producing Isolates to Different Antibiotics (%)***

| Antibiotics | E.coli(n=94) | Klebsiella spp(n=24) | Pseudo aeroginosa(n=14) | Enterobacter spp(n=6) | Citrobacter spp(n=4) |
|---|---|---|---|---|---|
| Ampicillin (10µg) | 2% | 44% | 68.7% | 37.5% | 87.5% |
| Ciprofloxacin(5µg) | 12% | 33% | 62.5% | 37.5% | 75% |
| Gentamicin(10µg) | 44% | 33% | 62.5% | 50% | 87.5% |
| Ceftriaxone(30µg) | 16% | 22% | 68.7% | 37.5% | 87.5% |
| Cefotaxime(30µg) | 22% | 34% | 68.7% | 37.5% | 87.5% |
| Ceftazidime(30µg) | 31% | 32% | 87.5% | 37.5% | 87.5% |
| Cefoxitin(30µg) | 39% | 33.4% | 68.7% | 37.5% | 87.5% |
| Cefepime(30µg) | 42% | 48% | 75% | 37.5% | 87.5% |
| Imipenem(10µg) | 98.6% | 97.2% | 97.2% | 99.3% | 99.3% |
| Meropenem(10µg) | 100% | 100% | 100% | 100% | 100% |

# DISCUSSION

Related to many other studies, here much higher antibiotic resistance pattern was observed. [1, 2] The above difference may be due to the geographic variations that were observed in the different strains of gram negative bacilli. In present study, 66% of gram negative isolate producing β-lactamase enzymes, so they are resistant to β-lactam group.A study from North India on uropathogens such as Klebsiella pneumoniae, Escherichia coli, Enterobacter, Proteus and Citrobacter spp., showed that 26.6% of the isolates were ESBL producers [3]. Similarly in our study we observed uropathogens such as, Escherichia coli, Klebsiella pneumoniae, showed that 36.6% of the isolates were ESBL producers A report from Coimbatore (India) showed that ESBL production was 41% in E. coli and 40% in K. pneumoniae [4]. Similarly in our study E. coli and 43% in K. pneumonia11% were observed. In a similar study by Mathur et al, 62% of the E. coli and 73% of the K. pneumoniae isolates were reported to be ESBL producers [5].The prevalence of ESBL producers varies across continents and countries and also within hospitals.[6,8] In our study the prevalence of ESBL was that E.coli – 94(43%) Klebsiella spp – 24(11%), Pseudomonos aeroginosa – 14(0.6%), Citrobacter spp – 4(0.18%), Enterobacter spp – 6(0.27%), were found to be ESBL positive by DDST. In our study, we observed that a majority of the isolates were susceptible to imipenem and Ertapenem. Similarly, in a study from Coimbatore, all the members of Enterobacteriaceaewere found to be susceptibile to Ertapenem and imipenem [9]. Our study showed that ESBL production was high among uropathogens. The situation is worsened due to increased multidurg resistance seen in ESBL producers than in non ESBL producers. Hence, routine ESBL testing for uropathogens along with conventional antibiogram would be useful for all cases of UTI.

# CONCLUSION

ESBL producing gram negative bacilli are the important emerging nosocomial pathogens. ESBL production should be tested by the conventional methods and should be reported along with routine antibiotic susceptibility testing in every microbiology lab, to help the physicians choose the appropriate antibiotics. Occurrence of multi-drug resistance to the third generation cephalosporins, aminoglycosides and fluoroquinolones is common among ESBL producers. Carbapenem is an effective drug for the treatment of infections which are caused by ESBL producers.

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