

## Short Communication

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### **Phenotypic Identification and Genotypic Characterization of Plasmid-Mediated AmpC $\beta$ -Lactamase-Producing *Escherichia coli* and *Klebsiella pneumoniae* Isolates in Iran**

**Saeedeh Robotjazi<sup>1</sup>, Farhad Nikkhahi<sup>1</sup>, Mojtaba Niazadeh<sup>1</sup>, Seyed Mahmoud Amin Marashi<sup>1</sup>, Amir Peymani<sup>1</sup>, Amir Javadi<sup>2</sup> & Amir Hossein Kashani<sup>1</sup>**

1. Medical Microbiology Research Center, Qazvin University of Medical Science, Qazvin, Iran
2. Department of Biostatistics, Qazvin University of Medical Sciences, Qazvin, Iran

#### Abstract

One of the mechanisms of *Klebsiella pneumoniae* and *Escherichia coli* resistance to  $\beta$ -lactam antibiotics is the production of  $\beta$ -lactamase enzymes. Among these are the AmpC  $\beta$ -lactamases, which confer resistance to a class of antibiotics. However, little is known about the AmpC  $\beta$ -lactamases of *K. pneumoniae* and *E. coli* clinical isolates in Qazvin, Iran. This study was designed to assess the AmpC  $\beta$ -lactamases-producing strains and also identify the prevalence of AmpC  $\beta$ -lactamases genes. Antimicrobial susceptibility tests were performed on 435 *K. pneumoniae* and *E. coli* isolates using disk diffusion technique. Plasmid-mediated AmpC genes were studied using a multiplex PCR assay. The AmpC  $\beta$ -lactamase-producer isolates were studied by employing cefoxitin disk diffusion test, AmpC induction test, AmpC cefoxitin-EDTA test, and boronic acid disk test. Our results showed that of 46 (18.4%) cefoxitin-insensitive *E. coli* isolates, 10 (21.7%) were positive for AmpC  $\beta$ -lactamase genes, among them 4 (8.69%) isolates were positive for *bla*<sub>DHA</sub> genes and 6 (13%) for *bla*<sub>CIT</sub> genes. Of 57 (30.4%) cefoxitin-insensitive *K. pneumoniae* isolates, 10 (17.5%) were positive for AmpC gene with 4 (6.34%) and 6 (9.5%) isolates positive for *bla*<sub>DHA</sub> and *bla*<sub>CIT</sub> genes, respectively. However, no *MOX*, *ACC*, *FOX*, or *EBC* genes were detected in the isolates. Considering the results of different confirmatory phenotypic tests, the AmpC cefoxitin-EDTA test showed a higher discriminatory power for detecting AmpC  $\beta$ -lactamase-producing strains. The specificity and sensitivity of AmpC cefoxitin-EDTA were 77%, 100% for *K. pneumoniae* and 70%, 90% for *E. coli* higher than the other two tests, respectively. Also, the authors demonstrated high prevalence rate for resistance to certain antibiotics, such as cefuroxime, trimethoprim-sulfamethoxazole, ampicillin, and cefotaxime. In conclusion, our study provided valuable information regarding the plasmid-mediated AmpC  $\beta$ -lactamase gene content, antibiotic resistance, and confirmatory phenotypic tests for AmpC  $\beta$ -lactamases in *E. coli* and *K. pneumoniae* isolates from clinical sources.