Phenotypic and Genotypic Characterization of Carbapenems Resistant Escherichia coli Isolated from Humans and Dogs

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Carbapenems are the treatment of choice for *E. coli* producing Extended Spectrum Chephalosporines (ESBLs). Resistance to carbapenems is also emerging through various mechanisms. We assessed the phylogeny, production of ESBLs, carbapenemases (CP)/metallo-beta-lactamases (MBLs), and presence of plasmid-mediated antimicrobial resistance genes in carbapenem-resistant *E. coli* isolated from extra intestinal infections of humans (n=21) and dogs (n=4). Antibiotic susceptibility was determined following EUCAST guidelines. ESBL production was assessed by the double disk synergy test (DDST) recommended by EUCAST 2017. CP and MBL production were determined by the Modified Hodge Test and Combined Disc Test following EUCAST guidelines. Phylogenetic group, ST131-O25b clone, and plasmid-mediated beta-lactam, carbapenem, and quinolone resistance genes, namely bla_{TEM}, bla_{SHV}, bla_{CTX-M}, bla_{KPC}, *qnrA*, *qnrB*, and *qnrS*, were assessed by PCR. Phenotypic tests confirmed four (16%), 12 (48%), and 17 (68%) were identified as producing ESBL, CP, and MBL respectively. Eight isolates did not produce CP and/or MBL. Carbapenem-resistant isolates were mostly in the phylogroup B2 (24/25), of which 41.6% belonged to the O25b-ST131 clone. Of the tested isolates, 72% harbored *qnrB*, while bla_{TEM} and $blas_{CTX-M}$ were present in 76% and 44% of the isolates, respectively. The *blaKPC* was detected only in five isolates. A considerable proportion of non carbapenemase producing carbapenem-resistant (NC-CR) strains were also detected. It warrants further studies to identify the resistance mechanisms of NC-CR isolates. The bla_{KPC} gene was detected only in a small proportion of isolates, and it is necessary to screen the isolates for other carbapenem-resistant genes to comprehend carbapenem resistance mechanisms.

Key words: *E. Coli*, Carbapenem, Resistant, Genes, Phylogroup

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