

OCCURRENCE OF NDM-5 AND ANTIBIOTIC RESISTANCE GENES AMONG *ESCHERICHIA COLI* AND *KLEBSIELLA PNEUMONIAE* IN COMPANION ANIMALS IN THAILAND

May Thet Paing Phoo¹, Ruttayaporn Ngasaman², Saowakon Indoung², Ampapan Naknaen³, Arnon Chukamnerd⁴ and Rattanuji Pomwised^{1*}

¹Department of Microbiology, Faculty of Science, ²Department of Veterinary Science, Faculty of Veterinary Science, ³Faculty of Environmental Management, ⁴Department of Biomedical Sciences, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand

Abstract. *Escherichia coli* and *Klebsiella pneumoniae* are infectious agents of concern in causing a variety of diseases, including diarrhea, respiratory diseases and septicemia, leading to morbidity and mortality in both humans and companion animals. Molecular characteristics of extended-spectrum β -lactamase (ESBL)- and carbapenemase-producing *E. coli* and *K. pneumoniae* in companion animals were investigated in 30 *E. coli* and 14 *K. pneumoniae* isolates from companion animals at the Veterinary Teaching Hospital, Faculty of Veterinary Science, Prince of Songkla University, Hat Yai, Songkhla, Thailand during August 2016 to January 2018. ESBL-producing *E. coli* harbored bla_{TEM} ($n = 2$) and bla_{CTX-M} ($n = 4$), while ESBL-producing *K. pneumoniae* harbored $bla_{TEM} + bla_{SHV} + bla_{CTX-M}$ ($n = 12$). Carbapenemase-producing *E. coli* ($n = 3$) and *K. pneumoniae* ($n = 8$) carried bla_{NDM-5} gene and AmpC-producing *E. coli* ($n = 6$) carried bla_{AmpC} . Plasmid-mediated quinolone resistance gene, *qnrS*, was predominantly detected in 7 *E. coli* strains, while that carrying *aac(6')-lb-cr* in 10 *K. pneumoniae* isolates. Phylogeny analysis demonstrated *E. coli* strains distributed into pathogenic groups B2 (27%) and D (20%), and commensal groups A (30%) and B1 (23%), while all *K. pneumoniae* strains belonged to KpI group. ERIC-PCR indicated high diversity of *E. coli* strains, while 11 *K. pneumoniae* originated from the same clone. Multilocus sequence typing of NDM-5-producing strains revealed in *E. coli* were ST224 ($n = 1$) and ST410 ($n = 2$) and in all *K. pneumoniae* ST147. In conclusion, as *E. coli* ST410 and *K. pneumoniae* ST147 are considered high-risk strains, companion animals might play a significant role in the dissemination of antibiotic resistance bacteria.

Keywords: *Escherichia coli*, *Klebsiella pneumoniae*, antibiotic resistance, carbapenemase, companion animal, ESBL, NDM-5, ST147, ST410.

Correspondence: Rattanuji Pomwised,
Department of Microbiology, Prince of Songkla
University, Amphoe Hat Yai, Songkhla 90112,
Thailand

Tel: +66 (0)74 288325; Fax: +66 (0)74 446661;
E-mail: rattanuji.p@psu.ac.th