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Tadashi Shimamoto

Hiroshima University, Japan

Molecular characterization of carbapenemase-producing Gram-negative bacteria in Egypt

Twenty-six carbapenem-resistant Gram-negative bacterial isolates were recovered from clinical samples between April 2014 and September 2014 at Tanta University Teaching Hospital, Egypt. Carbapenemase production was detected phenotypically using Modified Hodge Test (MHT) and Carbapenem Inactivation Method (CIM) in 22 isolates. Molecular characterization identified the presence of thirteen NDM-1-producers (four *Escherichia coli*, two *Klebsiella pneumoniae*, and seven *Providencia stuartii*), two *E. coli* co-carrying NDM-5 and OXA-181, and seven VIM-producing *Pseudomonas aeruginosa* (three VIM-2, three VIM-24, and one VIM-28). For the other four isolates, no carbapenemase activity and no carbapenemase gene was detected, suggesting non-carbapenemase related resistance. The 16S rDNA methylase gene, *rmtC* was detected in twelve isolates (four *E. coli*, two *K. pneumoniae*, and six *P. stuartii*). The PCR mapping of the *bla*_{NDM} gene showed that it was surrounded by a complete or truncated copy of insertion sequence IS_{Aba125} and followed by a bleomycin resistance gene *ble*_{MBL}, mediating resistance to bleomycin. ERIC-PCR analysis identified the presence of five clonally related *P. stuartii* isolates collected over a 1.5-month period. Each isolate, except one producing NDM-1 and the plasmid-mediated quinolone resistance gene *qnrA*, harbored NDM-1, and CMY β -lactamases and the 16S rDNA methylase gene, *rmtC*. To the best of our knowledge, this is the first report of an outbreak due to NDM-1-producing *P. stuartii*. Furthermore, ERIC-PCR analysis identified the presence of a clonal relationship between NDM-5-producing *E. coli*, VIM-2-producing *P. aeruginosa*, and VIM-24-producing *P. aeruginosa*. This work highlights the dissemination of different types of carbapenemases within a University Teaching Hospital in Egypt.

Biography

Tadashi Shimamoto has completed his PhD from Okayama University, Japan and Post-doctoral studies from University of Medicine and Dentistry of New Jersey (now known as Rutgers University), Robert Wood Johnson Medical School, NJ, USA. He is a Professor of Graduate School of Biosphere Science, Hiroshima University, Japan. He has published more than 70 papers in reputed international journals.

tadashis@hiroshima-u.ac.jp

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