

Comparison of Three Carbapenemase Producing Enterobacteria (CPE) Detection Methods

W.G.M. Kumudunie¹, Y.S. Wijayasinghe², W.R.P.L.I. Wijesooriya³, N.P. Sunil-Chandra⁴, K.D. Namalie⁵

Introduction: The emergence of carbapenem resistant enterobacteria (CRE) is a critical and growing health threat, causing a failure of almost all the available antibiotics and limiting the effective therapeutic options. CRE has been reported all over the world including Sri Lanka. The carbapenem resistance in enterobacteria is mainly occurred due to the production of carbapenemases, the carbapenem inactivating enzymes. Therefore, accurate and timely detection of CPE is an important aspect to streamline the empiric antibiotic therapy. In this study, three CPE detection methods namely, Carba NP-rapid biochemical test, modified carbapenem inhibition method (MCIM) and modified Hodge test (MHT) were compared for the detection of CPE. Carba NP test is a rapid biochemical test that requires 2 hours or less. However, both MCIM and MHT require incubation of 18 – 24 hours.

Objective: To compare the Carba NP-rapid biochemical test with the MCIM and MHT for the detection of CPE.

Methodology: Fifty-eight clinically significant CRE isolates were recovered from clinical specimens from patients attended to North Colombo Teaching Hospital (NCTH) during December 2017 – February 2018. Antibiotic sensitivity testing for the screening of CRE was performed according to Clinical and Laboratory Standards Institute (CLSI) guidelines. Enterobacteria, resistant to at least one carbapenem antibiotic were considered as CRE. Carba NP test, MCIM and MHT were carried out for CRE isolates according to the CLSI guidelines. Statistical analysis was done using R programming language (level of significance $P < 0.05$).

Results: Of 58 CRE, 94.82% (55/58) were confirmed as CPE via both MCIM and MHT while 77.58% (45/58) were revealed as CPE by Carba NP test. There was a significant reduction of CPE detection by Carba NP method compared to MCIM and MHT ($P = 0.007$).

Conclusion: Of the three CPE detection methods, sensitivity was higher in MCIM and MHT compared to Carba NP – rapid biochemical test.

Acknowledgement: Financial assistance by National Research Council, Sri Lanka (NRC 17-055) is acknowledged.

Keywords: Carbapenem Resistance, Carbapenemase, Enterobacteria, Carba NP, MCIM, MHT

¹ Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka; kumudumaheshika@gmail.com

² Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka

³ Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka

⁴ Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka

⁵ Laboratory of Medical Microbiology, North Colombo Teaching Hospital, Ragama, Sri Lanka