Detection of carbapenemase enzymes in clinical isolates of *Pseudomonas aeruginosa* by Re-modified Hodge Test and other phenotypic methods

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**Objectives:** Therapeutic failure to carbapenems is increasingly reported in *Pseudomonas aeruginosa* due to emergence and rapid spread of Metallo β-Lactamase (MBL) enzymes which are present even in carbapenem sensitive isolates. Presently no standard guidelines for phenotypic testing are available for detection of carbapenemase enzymes in *Pseudomonas aeruginosa* and previous reports are variable. Timely and accurate laboratory detection and reporting of such isolates harboring these enzymes will indicate their prevalence pattern and will help advent appropriate and rational use of alternative antimicrobials agents. Aim of present study was to detect the presence of carbapenemase enzyme activity in carbapenem resistant and sensitive isolates of *Pseudomonas aeruginosa*.

**Methods:** Study was conducted in Department of Microbiology at Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, a 1000 bedded tertiary care hospital in North India, over a 2 month period (August–September 2008). We evaluated a Re-modified Hodge Test and compared it with conventional Modified Hodge Test, Double Disc Synergy Test (DDST) using ethylendiaminetetraacetic acid (EDTA) with imipenem, meropenem and ceftazidime and EDTA Imipenem Microbiological (EIM) assay among carbapenem resistant and sensitive isolates of *Pseudomonas aeruginosa*. We also extended principle of three dimensional enzyme extract test (3DT) for evaluation of MBL activity. 114 isolates of *Pseudomonas aeruginosa* were divided into two groups (resistant and sensitive) based on minimum inhibitory concentration values.

**Results:** 83 isolates were carbapenem resistant and 31 were sensitive. Modified Hodge and re-modified Hodge tests were able to detect 58% and 82% of MBLs in carbapenem resistant, and carbapenem sensitive isolates respectively. Individually, EIM test and ceftazidime/EDTA DDST were the most sensitive tests detecting MBLs in 88% and 49% of carbapenem resistant, and 19% and 35.5% of carbapenem sensitive isolates respectively. 3DT for MBL detection had a poor sensitivity of 54% of carbapenem resistant and only 3% carbapenem sensitive strains.

**Conclusion:** This study validates the use of Re-Modified Hodge Test for routine detection of MBL activity in *Pseudomonas aeruginosa* as it is a sensitive and technically easy to perform phenotypic test. Its routine induction will maximize detection of MBL harboring *Pseudomonas aeruginosa* resulting in proper and effective antimicrobial guidance.