ORIGINAL ARTICLE

Dissemination of Pseudomonas aeruginosa producing bla$_{IMP-1}$ and bla$_{VIM-1}$ in Qazvin and Alborz educational hospitals, Iran

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ABSTRACT

Background and Objectives: Pseudomonas aeruginosa is a frequent opportunistic pathogen in health care associated infections that is highly resistant to the majority of β-lactams. The aims of this study were to access the antimicrobial susceptibility pattern of P. aeruginosa isolated from educational hospitals of Qazvin and Alborz provinces, to determine the prevalence of metallo-β-lactamase (MBL) among carbapenem non-susceptible isolates by combined disk (CD) method, and to detect the bla$_{IMP}$, bla$_{VIM}$, bla$_{SIM}$, bla$_{GIM}$, bla$_{SPM}$ and bla$_{NDM-1}$-MBL genes.

Materials and Methods: In this cross-sectional study, 300 P. aeruginosa isolates were collected from different clinical specimens in two provinces of Qazvin and Alborz hospitals, Iran. After identification of isolates by standard laboratory methods, antimicrobial susceptibility was done against 17 antibiotics according to clinical and laboratory standards institute (CLSI) guideline. CD method was carried out for detection of MBLs and the presence of bla$_{IMP}$, bla$_{VIM}$, bla$_{SIM}$, bla$_{GIM}$, bla$_{NDM-1}$ and bla$_{SPM}$-genes was further assessed by PCR and sequencing methods.

Results: In this study, 107 (35.66%) isolates were non-susceptible to imipenem and/or meropenem among those 56 (52.3%) isolates were metallo-β-lactamase producer. Twenty-four of 56 (42.85%) MBL-positive isolates were confirmed to be positive for MBL-encoding genes in which 14 (25%) and 10 (17.85%) isolates carried bla$_{IMP-1}$ and bla$_{VIM-1}$ genes either alone or in combination. Three (5.35%) isolates carried bla$_{IMP}$ and bla$_{VIM}$ genes, simultaneously.

Conclusion: Considering the moderate prevalence and clinical importance of MBL-producing isolates, rapid identification and use of appropriate infection control (IC) measures are necessary to prevent further spread of infections by these resistant organisms.

Keywords: Pseudomonas aeruginosa, Antibiotic resistance, Metallo-β-lactamase

INTRODUCTION

Pseudomonas aeruginosa is one of the most prevalent opportunistic human pathogen causing several clinical infections including wound infection, pneumonia, urinary tract infections, endocarditis, meningitis, brain abscess, and bacteremia (1-3). The increasing inappropriate use of broad-spectrum an-

tibiotics has increased the appearance of multidrug resistant P. aeruginosa (MDRPA) isolates which complicates the process of therapy and limits treatment options (4).

Multidrug resistant is defined as being resistant to at least 3 anti-pseudomonal antibiotic-groups including β-lactams, aminoglycosides, and fluoroquinolones (5). Carbapenems are antibiotics used for treatment of hospitalized patients infected with MDRPA (6). These antibiotics are a class of β-Lactam antibiotics with a broad spectrum of antibacterial activity and have the broadest antibacterial spectrum compared to other β-lactams such as penicillins and cephalosporins (7). However, the incidence

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