THE PREVALENCE OF METALLO-B-LACTAMASE IMP-7 GENE IN IMIPENEM AND MEROPENEM RESISTANT PSEUDOMONAS AERUGINOSA AMONG PATIENTS WITH DIFFERENT DISEASES IN EL-OBIED HOSPITALS – SUDAN

Wafaa Mohammed Adam Abdulrahaman
1 Department of Microbiology. Faculty of Medicine and Health Sciences, University of Kordofan, El-Obied, Sudan
Email: 1wafaaban@live.com

Abstract: Rapid spread of MBLs is an emerging threat and a matter of concern worldwide. So far, six MBL enzyme types have been described in clinical isolates of P. aeruginosa. In this article, we investigated the prevalence of Metallo-β-Lactamase IMP- 7 genes in imipenem and meropenem-resistant Pseudomonas aeruginosa isolated from Elobied Hospitals. A hundred (100) isolated Pseudomonas aeruginosa were cultured and identified using API thin subjected to antimicrobial susceptibility testing (Kirby Bauer), for selected imipenem and meropenem. PCR was performed for detection of IMP- 7 gene in imipenem and meropenem resistant P. aeruginosa strains. 19% and 14% isolates were found resistant to imipenem and meropenem respectively, 16 % of isolated resistant P. aeruginosa carry the IMP- 7gene which encoding resistant to imipenem and meropenem in our study. The study concluded that evidence of the presence of the IMP- 7gene.

Keywords— MBLs, P. aeruginosa, Prevalence, IMP-7, Imipenem and Meropenem

INTRODUCTION

Pseudomonas aeruginosa, an opportunistic pathogen, is an important cause of infection in patients with impaired immune systems, among the most important causes of serious hospital- acquired and community-onset bacterial infections in humans,
and resistance in these bacteria has become a growing problem.(1, 2) Pseudomonas aeruginosa is one of the 'ESKAPE' pathogens(Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, P. aeruginosa and Enterobacter spp.) known to be responsible for a majority of antimicrobial-resistant hospital-associated infections. They often colonize hospital equipment and tolerate a variety of physical conditions. (3, 4) The multidrug-resistant (MDR) phenotype in P. aeruginosa could

be mediated by several mechanisms. Furthermore, MBLs encoding genes are usually located on integrons, the mobile genetic elements that also carry genes encoding for resistance to aminoglycoside and other antibiotics resulting in multidrug resistance.(5)

The prevalence of MBL- producing Gram-negative bacilli has increased in some hospitals, particularly among clinical isolates of P. aeruginosa. Metallo-beta-lactamases are a group of β-lactamase enzymes that have one or two zinc (Zn) inactive β-lactam antibiotics. (6, 7, 8)Acquired Metallo-β- lactamases (MBLs) are emerging worldwide as powerful resistance determinants in Gram-negative bacteria.(9) The most widespread carbapenemases in Pseudomonas spp. are metallo-β-lactamases of VIM- (Verona imipenemase) and IMP- (Imipenemase) types.(10)The rapid spread of MBLs, particularly in P. aeruginosa, is an emerging threat and a matter of concern worldwide. (11) Since the first report of acquired Metallo-β lactamases (MBL) in Japan in 1994, genes encoding enzymes have spread rapidly among Pseudomonas spp., (7)

Most of the isolates resample to that in Egypt 2017 was resistant to carbapenems tested, including imipenem and meropenem. 13 isolates (11.4%) exhibited the metallo-β- lactamase (MBL) phenotype. MBLs encoding genes, VIM and IMP, were identified by PCR. (12)

The goal of this study was to identify the presence of bacterial genes involved in multiple resistances to antimicrobials in P. aeruginosa using the PCR method.

MATERIALS AND METHODS

Bacterial isolates

A hundred (100) specimens were obtained from patients and different hospitals settings during the study period from August 2016 to March 2017. All specimens were cultured, and P. aeruginosa were identified on the bases of conventional biochemical tests and API 12A/12E (Oxoid Company, Australia).

Antimicrobial susceptibility testing

Susceptibility testing of the isolates was performed by disk diffusion (Kirby Bauer) method. The selected antimicrobial disks were imipenem (10) mcg and meropenem (10) mcg (Oxoid Company. UK). P. aeruginosa ATCC 27853 was used as a quality control in the susceptibility testing. (13)

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