SMGroup

SM Journal of Biology

Editorial

Carbapenem-Resistant *Acinetobacter baumannii*: Epidemiology and Prevention in Iran

Habibeh Adibhesami[1], Abbas Farahani[2], Arezoo Asadi[3] and Davoud Afshar[1]*

[1]*Department of Pathobiology, Tehran University of Medical Sciences, Iran*
[2]*Department of Microbiology, Ahvaz Jundishapur University of Medical Sciences, Iran*
[3]*Department of Microbiology, Shahid Beheshti University of Medical Sciences, Iran*

Article Information

Received date: Sep 07, 2015
Accepted date: Sep 21, 2015
Published date: Sep 25, 2015

***Corresponding author**

Davoud Afshar, Department of Pathobiology, Tehran University of Medical Sciences, Iran; Tel: +989148125895; Email: davoodafshar@yahoo.com

Editorial

Over the past 10 years, dissemination of Carbapenem-Resistant *Acinetobacter baumannii* (CRAB) has led to an increase in the prevalence of Carbapenem-resistant Gram negative bacteria in the Iran. Carbapenems are used as a first choice drug for treatment of *Acinetobacter baumannii* infections. Extensive resistance to Carbapenemes, has become a major challenge for treatment of *Acinetobacter baumannii* infections. Infections caused by CRAB have limited treatment options and have been associated with high mortality rates in worldwide. Resistance to Carbapenemes first was reported in 1991 than its distribution was observed worldwide. Recent studies have revealed that 98% of *Acinetobacter baumannii* isolates in different Tehran hospitals are resistant to Carbapenemes (Imipenem and Meropenem). While the rate of resistance to Carbapenemes was reported to be 52/5% in 2009.

Several mechanisms are involved in developing of CRAB. These mechanisms include the enzymatic hydrolysis mediated by the oxacillinases of Ambler class D OXA-type, Carbapenem-hydrolyzing-β-lactamases of molecular class B and sometimes alteration of Penicillin-Binding Proteins (PBP) or increased activity efflux pumps [1].

Metallo-β-Lactamases (MBL) and oxacillinases are found to be more frequent. So far the oxacillinase genes such as blaOXA-23-like, blaOXA-24-like, blaOXA-51-like and blaOXA-58-like also MBLs such as Seoul metallo-β-lactamase Imipenemase (SIM), Sno Paolo metallo (SPM), New Delhi Metallo-β-lactamase (NDM), Verona Integron-encoded Metallo-β-lactamases (VIM) and Imipenemase (IMP) have been reported in *Acinetobacter baumannii* isolates. There have been numerous studies performed aiming to identify these mechanisms in Iran [2].

Oxacillinases are able to induce resistance in most of Carbapenemes. The presence of Oxacillines increase the rate of resistance to current treatments.The presence of oxacillinases cause resistance to betalactames, oxa-51 which exist innately in *Acinetobacter baumannii* and sometimes is used to identify the bacteria as well. The recent studies revealed that oxa-51 exist almost in all isolates of *Acinetobacter baumannii* [3]. Despite high occurrence of oxa-51 genes in *Acinetobacter baumannii* isolates, the induction of resistance only occurs when it is over expressed following the insertion of ISAba1. Several subgroups of oxacillinases including oxa-24, oxa-23 and oxa-58 are observed ranging from 25-85, 0-15 and 0-21% respectively. Although MBLs have less important than OXA, recent studies in Iran have identified different levels of IMP, SPM and VIM genes [2].

Matallo-β-lactamases are considered important because of their ability to hydrolyze all betalactames except monobactam. MBL genes are located on Class I integrons. Some genes are on plasmids and some on chromosomes. The occurrence of these genes on transmissible agents increase their transmission to other strains. MBLs are investigated using phenotypic and molecular methods [3].

Phenotype methods (such as combined disk diffusion or double disk synergy test) usually are used to screen mettalo-β-lactamases in research centers. Using phenotype method the prevalence of MBL was estimated 86 to 100% in Iran. PCR as a molecular method is used frequently and, recent studies in Iran have identified different levels of IMP, SPM and VIM genes in *Acinetobacter baumannii* using PCR method. There may be other mechanisms in developing resistance; however few studies are conducted to discover them in *Acinetobacter baumannii* isolates.

The presence of class D oxacillins and MBL has increased the rate of resistance in *Acinetobacter baumannii* isolates. Therefore, control of resistance and discovering new strategies to prevent distribution and treatment of resistance are critical solutions to combat the infection. As a result, preventing both CRAB transmission and CRAB infections have become important public health

objectives. This review describes the current epidemiology of CRAB in the Iran and highlights important prevention strategies.

References

1. Azimi L, Talebi M, Pourshafie MR, Owlia P, Rastegar Lari A. Characterization of Carbapenemases in Extensively Drug Resistance *Acinetobacter baumannii* in a Burn Care Center in Iran. Int J Mol Cell Med. 2015; 4: 46-53.
2. Fallah F, Noori M, Hashemi A, Goudarzi H, Karimi A, Erfanimanesh S, et al. Prevalence of bla NDM, bla PER, bla VEB, bla IMP, and bla VIM Genes among *Acinetobacter baumannii* Isolated from Two Hospitals of Tehran, Iran. Scientifica (Cairo). 2014; 2014: 245162.
3. Mohajeri P, Farahani A, Feizabadi MM, Norozi B. Clonal evolution multi-drug resistant Acinetobacter baumannii by pulsed-field gel electrophoresis. Indian J Med Microbiol. 2015; 33: 87-91.