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ORIGINAL ARTICLE

Evaluation of mechanisms of colistin resistance in *Klebsiella pneumoniae* strains isolated from patients with urinary tract infection in ICU

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ABSTRACT

Background and Objectives: One of the major causes of urinary tract infections is *Klebsiella pneumoniae*. Currently, few studies investigated the mechanisms of resistance to colistin in Iran. The current study aimed to determine the prevalence of plasmid and chromosome-mediated resistance to colistin in *K. pneumoniae* isolates.
Materials and Methods: 177 urine samples were collected from patients with urinary tract infections hospitalized in the intensive care unit (ICU) of hospitals in the city of Qazvin. *K. pneumoniae* isolates were identified by standard biochemical methods, resistance to colistin among *K. pneumoniae* isolates were tested by disk diffusion and microbroth dilution methods. The chromosomal mutation and presence of the mcr genes in colistin-resistant *K. pneumoniae* were evaluated by PCR.
Results: Out of 177 samples, 65 *K. pneumoniae* were obtained from patients in the ICU. Six colistin-resistant isolates were isolated with MIC values ≥4 µg/mL, none of them was positive for *mcr1-5*. In 4 isolates, missense mutation in *mgrB* gene resulted in amino acid substitutions and in one isolate of *mgrB* gene was found intact *mgrB* gene.
Conclusion: The results suggest that *mgrB* mutation was the main mutation among colistin-resistant isolates and plasmid-borne colistin resistance was not expanded among strains.

Keywords: *Klebsiella pneumoniae*; Colistin; *MgrB*; *Mcr* gene; Intensive care units

INTRODUCTION

In recent years, due to the emergence of new infections and the spread of infections caused by multidrug-resistant Gram-negative bacteria (MDR), the lives of many patients have been threatened and financial costs of health systems have substantially increased all around the world. Parallel to the increase in antibiotic resistance, particularly among members of the *Enterobacteriaceae* family, therapeutic abscesses were restricted and few new drugs were developed (1). *Klebsiella pneumoniae* is one of the major causes of nosocomial infections that can carry many antibiotic resistance genes such as extended-spectrum beta-lactamases (ESBLs), and because of the production of these enzymes, the use of third and fourth generation cephalosporins is restricted and therefore carbapenems were started to use (2, 3). *K. pneumoniae* is also resistant to these drugs (carbapenems) by plasmid-mediated carbapenemase production (2, 3). Cationic polymyxin antibiotics (polymyxin B and colistin), which were discarded in the

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