

## Study of the Aminoglycoside Resistance Genes *acc(3)-Ia*, *Aac(6')-Ib*, *acc(3)-IIa*, *ArmA* and *RmtB* in Clinical Strain's of *Klebsiella pneumoniae* Isolated from Ilam Hospitals and Milad Hospital of Tehran

Nasser Samadi<sup>1</sup>; Iraj Pakzad\*<sup>1</sup>; Mohamad Iman Eini<sup>2</sup>; Morovat Taheri Kalani<sup>1</sup>; Karimolah Qasemi Germi<sup>3</sup>

*1-Department of Microbiology, Faculty of Medicine and Clinical Microbiology Research Center, Ilam University of Medical Sciences, Ilam, Iran*

*2-Department of Microbiology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

*3-Department of Biology, Faculty of Biology Sciences, Mohaghegh Ardebili, Ardebil University, Ardebil, Iran*  
samadi.naser@yahoo.com

**Background & Objectives:** Aminoglycosides are the most commonly used antibiotics in the treatment of infectious by both Gram-negative and Gram-positive bacteria. They bind to the ribosomes and thus interfere with protein synthesis(1,2,3). The major mechanism of resistance to aminoglycoside antibiotics in clinical bacterial isolates is the production of three types of aminoglycoside-modifying enzymes, aminoglycoside phosphotransferases (APHs), aminoglycoside acetyltransferases (AACs), and aminoglycoside nucleotidyltransferases (ANTs). The APHs and ANTs are the bisubstrate enzymes that facilitate transfer of the  $\gamma$ -phosphate and nucleotide monophosphate, respectively, from a nucleotide substrate to the hydroxyl groups of aminoglycoside antibiotics, while AACs acetylate amino groups derived from acetyl coenzyme A (acetyl-CoA) (4). The 16S rRNA methylase confers high-level resistance to 4,6-substituted deoxystreptamines, including arbekacin, amikacin, kanamycin, tobramycin and gentamicin, by posttranscriptional methylation of 16S rRNA leading to loss of affinity for aminoglycosides(5). The purpose of the present study is to investigate the mechanisms involved in the resistance of *E. coli* to aminoglycosides.

**Methods:** 144 clinical strain's of *E.coli* isolated from Ilam hospitals and Milad hospital of Tehran. Antibiotic susceptibility for screening of resistance isolates was done by Kirby-Bauer Methods for Gentamicin, Amikacin, Kanamycin, Tobramycin and Netilmicin. The *acc(3)-Ia*, *aac(6')-Ib*, *acc(3)-IIa* and 16SrRNA methylase genes(*armA* and *rmtB*) were detected by PCR amplification.

**Results:** Among the 144 *E.coli* isolated, the most resistance(21.5%) observed for Gentamicin. 31 isolates were resistance and 19 isolates were intermediate at least for one of aminoglycosides. Among 50 isolates with resistance or intermediate susceptibility, 19(38%) and 27(54%) isolates shown the *acc(3)-IIa* and *aac(6')-Ib* respectively and *acc(3)-Ia*, *armA* and *rmtB* observed in non of isolates.

**Conclusion:** The level of resistance to aminoglycoside antibiotics is influenced by many factors, including the amount of modifying enzyme produced and the rate of penetration of the antibiotic into the bacterial cell and efflux pumps.

**Keywords:** *E.coli*, Aminoglycoside Resistance Genes, 16S RRNA Methylase