

## Prevalence of *aac(3)-IIa*, *aph(3)-Ia* and *ant(2)-Ia* Genes among Uropathogenic *Escherichia Coli* Isolates

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### Abstract

**Background and Objective:** *Escherichia coli*, one of the most common causative agents of urinary tract infections (UTIs) acquired from community and hospital, has developed multiple resistances to various antibiotics such as aminoglycosides. The main resistance mechanism to aminoglycosides is inactivation of these drugs by a variety of acetyltransferase, nucleotidyltransferase, and phosphotransferase enzymes. This study aimed to assess the prevalence of resistance to some important aminoglycosides as well as the distribution of *aph(3)-Ia*, *aac(3)-IIa* and *ant(2)-Ia* genes among uropathogenic *Escherichia coli* isolates obtained from patients suffering UTIs.

**Material and Methods:** Using the disk diffusion method, the antimicrobial susceptibility of 200 uropathogenic *E. coli* isolates collected from outpatients and inpatients was investigated to nine antibiotics. Then, the distribution of *aac (3)-IIa*, *aph (3)-IA* and *ant (2)-IA* genes was determined by PCR method.

**Results:** Thirty-nine percent of *E.coli* isolates obtained from inpatients (n=100) and 19% of those from outpatient (n=100) demonstrated resistance to at least one of the tested aminoglycosides (i.e. 58 isolates). Among the isolates examined (n=200), 19.5%, 13%, 7.5% and 4.5% were resistant to gentamicin, kanamycin, neomycin and amikacin, respectively. The most prevalent gene among the strains resistant to at least one of the aminoglycosides (n=58) was *aac (3)-IIa* (65.5%), followed by *aph (3)-IA* (25.8%). Also, the *ant (2)-IA* gene was not seen in any isolates.

**Conclusion:** The presence of *aac (3)-IIa* gene is significantly associated with gentamicin resistance (100%, p<0.05). Because of relatively high distribution of the *aac (3)-IIa* gene among uropathogenic *E.coli*, the use of aminoglycosides such as amikacin to treat UTI in clinical setting is recommended.

**Keywords:** *Escherichia Coli*, Urinary Tract Infections, Aminoglycoside-Modifying Enzymes (AMEs)