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**Permethrin resistance in head lice in Istanbul, Turkey: a pilot study**

Burak Batir<sup>1</sup>, Baris Cilga<sup>2</sup>, Beril Mat<sup>2</sup>, Burak Cakmak<sup>2</sup>, Hürriyet Deniz Özgün<sup>2</sup>, Tolga Orhan<sup>2</sup>,  
Özgür Kurt<sup>\*3</sup>

<sup>1</sup>*Celal Bayar University Faculty of Medicine; Medical Genetics*

<sup>2</sup>*Acibadem University Faculty of Medicine*

<sup>3</sup>*Acibadem University Faculty of Medicine; Medical Microbiology*

**Background:** Head lice infestation (HLI) caused by *Pediculus humanus capitis* (De Geer) is a significant public health problem worldwide. It may cause not only severe itching on the scalp, recent reports suggest that head lice may transmit serious bacterial infections, such as *Acinetobacter baumannii* to humans. Permethrin has been used effectively in HLI treatment; however, reports from different regions of the world described an emerging resistance to permethrin, which is mainly due to M815I mutations on voltage-sensitive sodium channels of  $\alpha$ -subunit gene located on the IIS1-2 extracellular loop. Despite families and physicians sometimes complain about HLI irresponsive to permethrin treatment in Turkey, there is no report about permethrin resistance in native isolates of *P. capitis*. Here, we present the results of our preliminary study on permethrin resistance in 92 *P. capitis* isolates obtained from 32 children in two primary schools in Istanbul.

**Material/methods:** The head lice were initially grounded in liquid nitrogen in different vials. Following genomic DNA isolation, the fragment of voltage-sensitive sodium channel  $\alpha$ -subunit gene, containing M815I mutation site, was amplified in each sample by PCR. Obtained PCR products were then sequenced with “Big DyeCycle Sequencing Kit® (Applied Biosystems, Foster City, California)” using an ABI 3130 XL genetic analyzer (Applied Biosystems). The sequence of voltage-sensitive sodium channel  $\alpha$ -subunit gene was aligned using MEGA 7 software, and SHEsis Online Software (Bio-X Research Institute of Shanghai Jiao Tong University, Shanghai, China) was used to calculate the frequencies for alleles, genotypes and haplotypes, and the resistance level was evaluated on a scale within 0 to 1.00, where 1.00 indicated highest resistance.

**Results:** Our results showed a novel mutation on the first nucleotide of 815<sup>th</sup> amino acid, defined as M815F (ATG>TTT) mutation. The preferred location of different amino acids in protein molecules can be characterized by calculating the extent by which an amino acid is buried in the structure. Analyses indicated that both M815I (ATG>ATT) and M815F amino acids in our samples were highly buried on

the extracellular loop between the IIS1 and IIS2 transmembrane segments of the voltage-sensitive sodium channel alpha-subunit (Figure 1). Analyses of our data revealed a resistance frequency of 0.972 (M815I=0.481 and M815F=0.492) among the isolates in the study.

**Conclusions:** This is the first report of permethrin resistance in head lice in Istanbul, Turkey. Our findings indicate high resistance rates among local head lice isolates, which may define the increasing number of cases irresponsive to permethrin treatment, which is commonly preferred as it is available and relatively inexpensive. Large-scale studies from different provinces are necessary to unveil the scale of permethrin resistance in Turkey.