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VARIATIONS IN SUSCEPTIBILITY TO ACETAMIPRID ALTER *ACE-1* PROTEIN INTERACTION IN ACETAMIPRID-RESISTANT ACSF-10 STRAIN OF *AEDES AEGYPTI*

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Abstract

Aedes aegypti, a cosmopolitan disease vector of several diseases, has become resistant to traditionally used insecticides. Among various mechanisms, increased titres of metabolic detoxification enzymes and target site insensitivity appear to make the mosquitoes immune to these pesticides. According to our previous research, treatment of susceptible *Ae. aegypti* larvae (PS strain) with acetamiprid for 10 consecutive generations (ACSF-10 strain) induced acetamiprid resistance in them possibly because of genetically mutated acetylcholinesterase enzyme. Hence, this study made an attempt to anticipate the three-dimensional (3D) structure of acetylcholinesterase enzyme (ACE-1) sourced from *Ae. aegypti* early fourth instar larvae of ACSF-10 strain. The molecular docking studies were conducted to assess the interaction between acetamiprid and the ACE-1 proteins. The findings revealed key features of the interactions, including hydrophobic interactions and hydrogen bonds. This study contributes valuable insights into the mechanisms of insecticide resistance in *Ae. aegypti* and provides a foundation for the formulation of insecticides with higher efficacy. It is hypothesized that understanding the interactions between acetamiprid and detoxifying enzymes through the structural characterization of ACE-1 proteins will help develop novel, more effective and eco-safe insecticides.

Key words: ACE-1, acetamiprid, *Aedes aegypti*, hydrophobic interactions, resistance

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