Neuroprotective Potential of Premna odorata (Alagau) Leaf Ethanolic Extract Against Alzheimer's Disease Using Deltamethrin-Induced Neurotoxicity in Drosophila melanogaster (Fruit fly): In silico and in vivo Analyses

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The therapeutic value of traditional plants in the Philippines remains underexplored. Thus, this study investigates the neuroprotective potential of Premna odorata leaf extract for Alzheimer's disease (AD). Leaves underwent ethanolic extraction prior to LC-MS analysis for chemical profiling. The 3D structures of the identified compounds and AD-related proteins (AChE and BACE1) were prepared using Open Babel and PyMol. Binding affinities and orientations were analyzed through AutoDock Vina and Discovery Studio. The molecular structures of the compounds were uploaded to SwissADME and Osiris tools to test for their ADMET properties. Acute toxicity assay involved exposing Drosophila melanogaster to various concentrations of P. odorata extract (100 ug/mL, 500 ug/mL, and 1000 µg/mL). Survival assay used four groups, with 20 flies each, exposing them to Deltamethrin prior to P. odorata extract treatment. Climbing assay tested motor function by observing how many flies could climb past the 8-cm line within 8 seconds, repeated in 3 trials per group. Fifty-seven bioactive compounds were identified, with 10 novel compounds screened for neuroprotection. The novel compounds showed strong binding affinities, suggesting they can target both neurotransmission enhancement and amyloid plaque reduction. ADMET profiling revealed favorable drug-like properties for the active compounds, showing high drug-likeness and no toxicity properties. Acute toxicity assay revealed no adverse effects at all tested concentrations. Survival and climbing performances were greatly improved with the extract, showing dose-dependent results with 100 ug/mL demonstrating the best results. This study proves P. odorata as a promising source of bioactive compounds with therapeutic application in AD treatment.

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