

Computational And Experimental Validation of Asiatic Acid As A Multitarget Neuroprotective Compound in Alzheimer's Disease

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Asiatic acid offers a multi-target strategy for Alzheimer's disease by modulating neuroinflammation, oxidative stress, and neurodegeneration.

INTRODUCTION	METHODS	RESULTS	REFERENCES
Alzheimer's disease (AD) is a debilitating neurodegenerative condition marked by progressive memory loss, cognitive deterioration, and sustained neuroinflammation. Despite advances in research, current therapeutic strategies remain largely palliative, underscoring the urgent need for safer, multi-targeted interventions. Asiatic acid (AA), a bioactive triterpenoid derived from <i>Centella asiatica</i>, has garnered attention for its neuroprotective, antioxidant, and anti-inflammatory properties.	A total of 419 Alzheimer's disease related genes were identified using GeneCards and DisGeNET databases, while 100 potential targets of Asiatic acid (AA) were predicted through Swiss Target. Nineteen overlapping genes were identified and further analysed. PPI network was constructed using the STRING database and visualized in Cytoscape, with hub genes determined through the CytoNCA plugin. Gene Ontology (GO) and KEGG pathway mapping was performed using ShinyGO to identify key biological pathways. Molecular docking was carried out to evaluate the binding affinity of AA with critical inflammatory targets such as ALOX5 and IL-6. SH-SY5Y neuroblastoma cells were treated with lipopolysaccharide in the presence or absence of AA. MTT assay was performed and biochemical parameters including ROS, IL-6, MDA, GSH, and SOD levels were estimated to evaluate oxidative stress and inflammatory response.	Alzheimer's disease GeneCards DisGeNET Asiatic acid (AA) SIB Swiss Target 419 GENES 19 GENES PPI Network Top10 Hub genes Molecular docking (AA and Protein encoded by 10 Hub genes) SH-SY5Y cell line Control LPS LPS+AA AA MTT Assay Biochemical Assays Oxidative stress Neuroinflammation Cell Survival Cell Viability (%) Concentration (µg/ml) MDA ↑ GSH ↓ ROS ↑ SOD ↑ IL-6 ↑ ALOX-5 IL-6 CONCLUSIONS Asiatic acid demonstrates strong potential as a multi-target agent for Alzheimer's disease by modulating neuroinflammatory and oxidative stress pathways. This integrative approach supports its future therapeutic exploration.	Firdaus Z, Gutti G, Ganeshpurkar A, et al (2024) Centella asiatica improves memory and executive function in middle-aged rats by controlling oxidative stress and cholinergic transmission. Journal of Ethnopharmacology 325:117888. https://doi.org/10.1016/j.jep.2024.117888 Firdaus Z, Kumar D, Singh SK, Singh TD (2022a) Centella asiatica Alleviates AICl3-induced Cognitive Impairment, Oxidative Stress, and Neurodegeneration by Modulating Cholinergic Activity and Oxidative Burden in Rat Brain. Biological Trace Element Research 200:5115–5126. https://doi.org/10.1007/s12011-021- CONTACT Mobile No.: 7272188889 Gmail: gupta.aditi261@gmail.com ALZHEIMER'S ASSOCIATION AAIC>26