Anti- Neurodegenerative of Gac fruit parts and potential contributors by using HT-22 cell model

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Abstract

Chronic and repeated acute stress increases release of stress hormones which initiate beta amyloid (Aβ) creation and leads to neurodegenerative disorder. Gac fruit have some effect to neural out growth factor.

In this study, fresh Gac fruit parts were extracted with different polarity solvents including water, 80% ethanol, ethyl acetate, and n-hexane to identify the neuroprotective and improvement effect of Gac fruit against Aβ induced neurotoxicity in HT-22 cells.

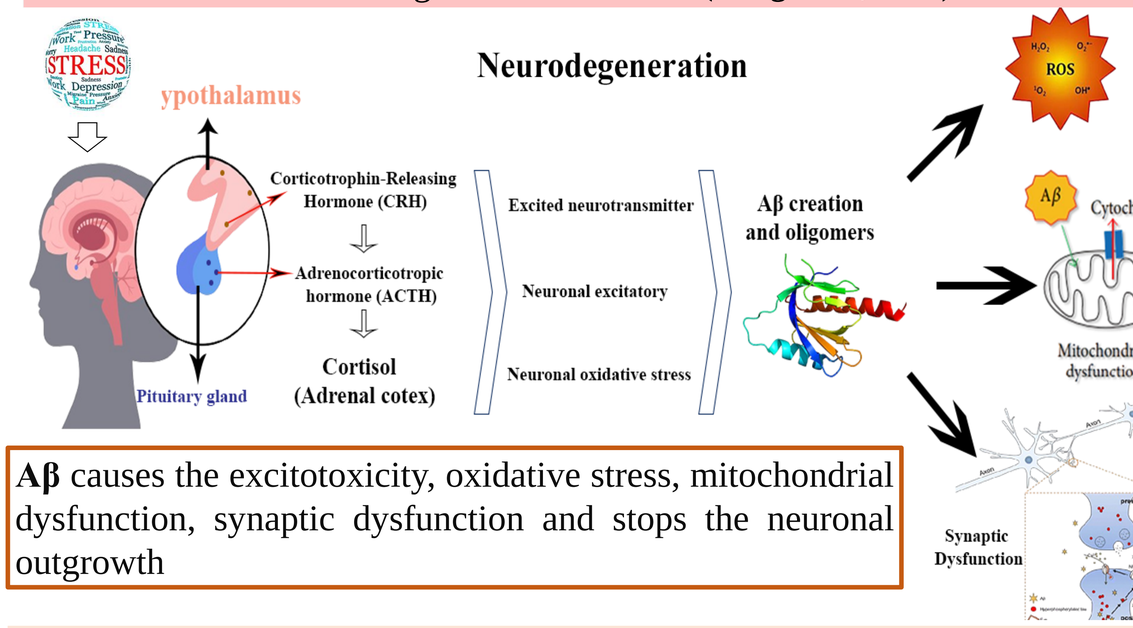
Results showed that peel 80% ethanol extract (PE-EtOH) and seed ethyl acetate extract (SE-EtOAc) have higher neuro-protective effect as compared to other Gac fruit parts extracts. In compression PE-EtOH, SE-EtOAc, and memantine post-treatment, only PE-EtOH showed significant increase in cell viability percentage and recovered the cell damage by reducing the intracellular ROS and improving the mitochondrial function.

Gac fruit peel can be used to treat and recover the Aβ induced neurodegenerative disorder. Future study need to find the cellular mechanics and active compounds.

Keywords: Chronic stress, Glucocorticoids, Beta Amyloid, Bioactive compounds

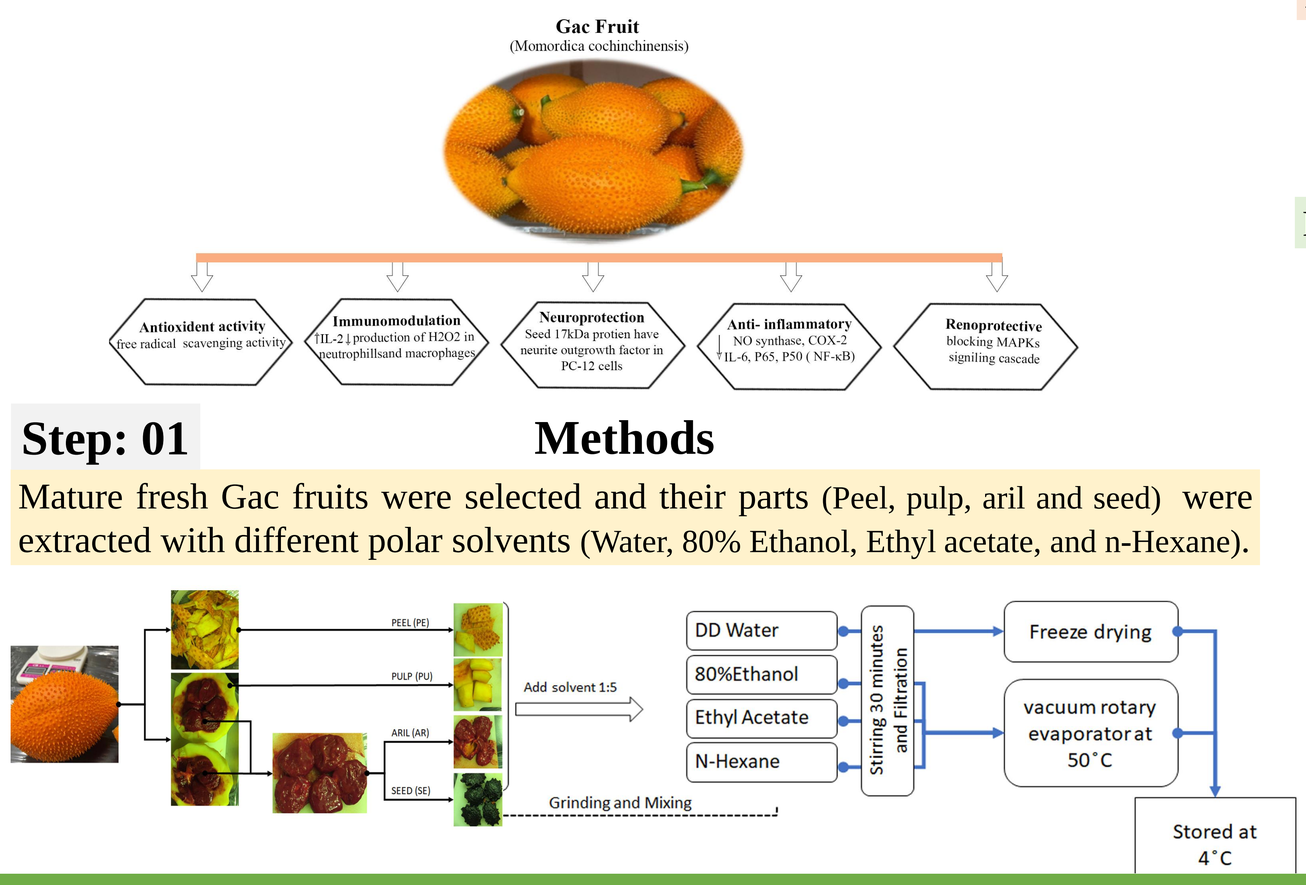
Introduction

Due to the lipophilic property of Stress Harmons can crosses the blood-brain barrier and cause Neurodegenerative disorder **(Dong et al., 2008).**



Aβ causes the excitotoxicity, oxidative stress, mitochondrial dysfunction, synaptic dysfunction and stops the neuronal outgrowth

Gac fruit is rich in nutrients, carotenoids, fatty acids, α-tocopherol, vitamin C, polyphenol compounds and flavonoids. It have a lot health benefits **(Do et al., 2019).**



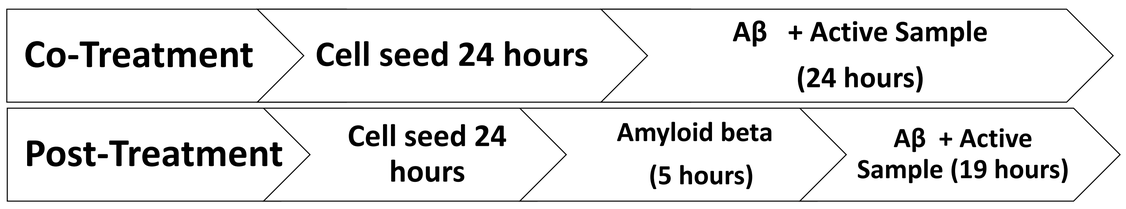
Step: 01

Methods

Mature fresh Gac fruits were selected and their parts (Peel, pulp, aril and seed) were extracted with different polar solvents (Water, 80% Ethanol, Ethyl acetate, and n-Hexane).

Step: 02

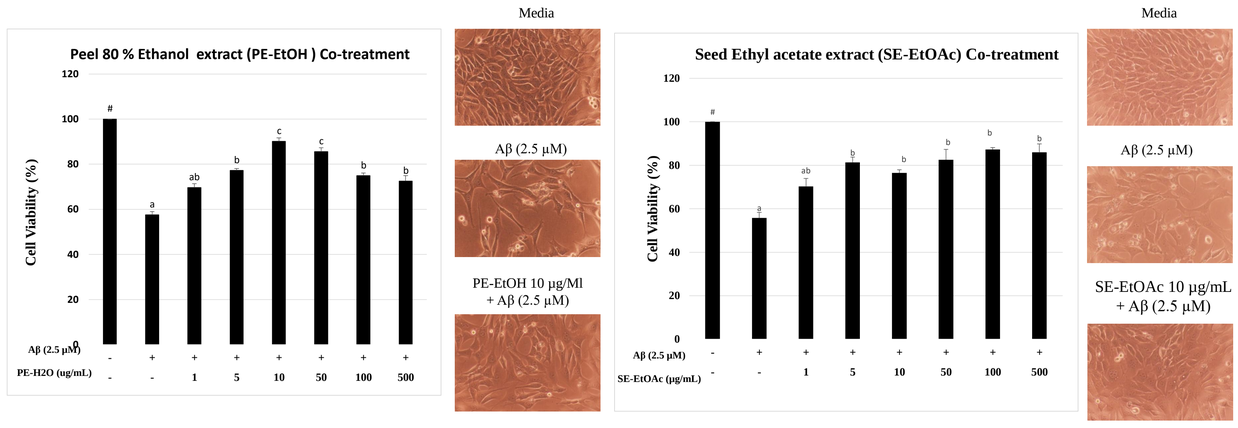
Amyloid beta-induced neurodegenerative immortalized mouse hippocampal cell line HT-22 was use to check the Co- and Post-treatment effect of Gac fruit parts extracts.



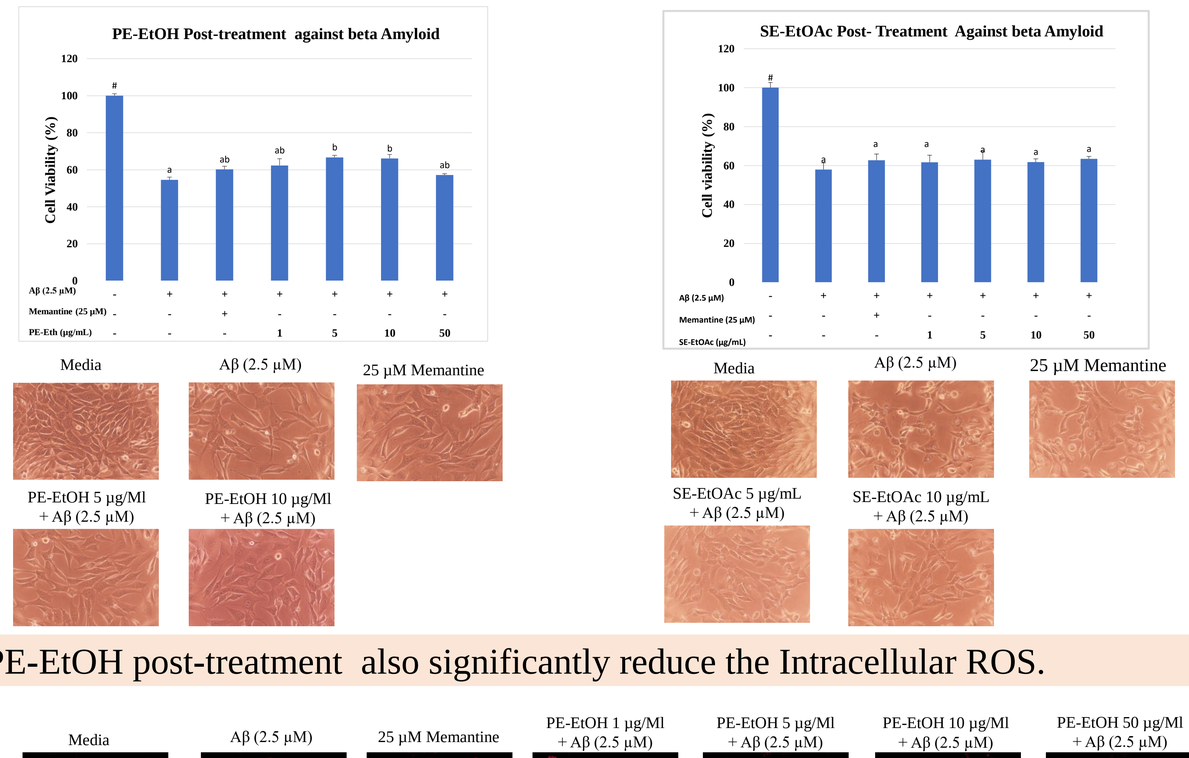
5 h incubation of HT-22 with 2 µM Aβ (1-42) oligomers leads to the internalization of 135 ± 15 nM of Aβ (1-42), respectively (**Joana et al., 2023**).

Results

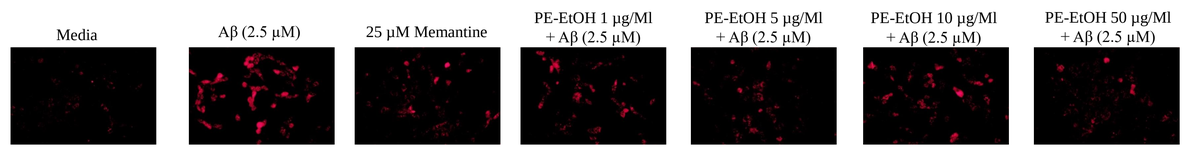
Gac fruit parts (peel, pulp, aril and seed) water, 80% ethanol, ethyl acetate and hexane extracts screened for the neuroprotective effect. Only Peel 80% ethanol and Seed Ethyl acetate showed the greater protective effects.



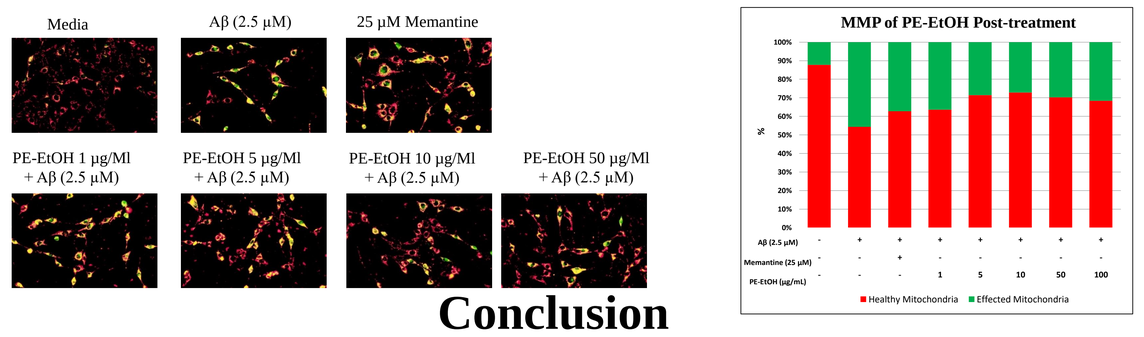
25 µM Memantine showed the significant protection in co-treatment model. Memantine used to compare improvement effect of Gac fruit in Post-treatment model.



PE-EtOH post-treatment also significantly reduce the Intracellular ROS.



PE-EtOH post-treatment significantly increased the mitochondrial function.



Conclusion

Gac fruit peel not only offers remarkable neuroprotective effects but also shows significant recovery after neurodegenerative damage. These promising results highlight the need for further investigation into the cellular mechanisms and active compounds responsible for these benefits, opening up exciting possibilities for developing innovative post-treatment strategies against neurodegeneration.

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