Neuroprotective Potential of Seaweed Extracts and Naringenin

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Outline

1. Introduction
2. Seaweeds' neuroprotective potential set in vitro on a human cellular stress model
3. Naringenin alleviates 6-hydroxydopamine (6-OHDA) induced Parkinsonism in SH-SY5Y cells and zebrafish model
4. Conclusion

Abstract

Parkinson's disease (PD) is a progressive neurodegenerative disorder predominantly affecting the motor system. It is characterized by the loss of dopamine-producing neurons in the substantia nigra region of the midbrain. Seaweeds are known to contain bioactive molecules with high antioxidant capacity. Naringenin possesses anti-inflammatory properties, high antioxidant capacity, and free radical scavenging abilities, and it can penetrate the blood-brain barrier. Some studies suggest that antioxidants may have neuroprotective activities. Therefore, this report investigates the potential neuroprotective effects of seaweed extracts and naringenin on SH-SY5Y cells. The results indicate that seaweed extracts can enhance the viability of SH-SY5Y cells and inhibit dopamine-induced neurotoxicity. Under the influence of dopamine, cell viability was partially restored by 20-30% when treated with certain seaweed extracts. Moreover, caspase-3 activity was effectively inhibited, returning to levels similar to those before dopamine induction. In terms of mitochondrial membrane potential, it could be restored by up to 60% compared to the depolarization induced by dopamine. Principal Component Analysis (PCA) suggested that caspase-3 activity was related to neuroprotective activity but not directly associated with mitochondrial membrane potential, indicating that the protective mechanism of seaweed extracts may not be directly linked to mitochondrial membrane potential. Naringenin effectively reduced the increased levels of ROS induced by 6-OHDA, restored antioxidant enzyme levels (CAT, GSH, SOD), and mitochondrial membrane potential in SH-SY5Y cells. It also altered the mRNA expressions of *LRRK2*, *PINK1*, *CASP9*, *POLG* which are related to Parkinson's disease, and improved behavioral patterns in a zebrafish model.