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Neuroprotective Activity of Pyrazolone Derivatives Against Paraquat-induced Oxidative Stress and Locomotor Impairment in Drosophila melanogaster

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Abstract

Objectives: In the present study, we have demonstrated the antioxidant and neuroprotective effects of certain substituted hydrazine pyrazolones.

Methods: The compounds were synthesized and characterized by spectral data by reported methods. The antioxidant ability of the compounds was confirmed through in vitro antioxidant (DPPH scavenging, ABTS radical scavenging, total antioxidant capacity, and ferric reducing activity) studies. In vivo neuroprotective activity of the test, compounds were determined in Drosophila melanogaster Oregon K (OK) adult male flies. Oxidative stress was induced by using paraquat (PQ). Edaravone (EDA) was used as a standard for studies.

Results: Compound C4 was efficient in the modulation of lipid peroxidation marker levels such as malondialdehyde (MDA) and hydroperoxide (HP). Glutathione (GSH) levels were elevated in C4 treated flies significantly. The modulatory effect on enzyme antioxidants superoxide dismutase (SOD) and catalase (CAT) was observed in compound pretreatedflies. Pretreatment of compounds through dietary feeding and co-exposure to PQ showed a lower death rate in flies. The neuroprotective efficacy of the compounds was confirmed through a negative geotaxis assay.

Conclusion: Flies treated with compounds and PQ co-exposure showed improvement in motor activities, suggesting the neuroprotective potential of pyrazolone derivatives. This might be due to their antioxidant ability while the precise mechanism of action needs further investigations. Among the tested compounds, C4 showed significant antioxidant and neuroprotective activity.

Author Keywords

Neuroprotection, Drosophila, Oxidative stress, Pyrazolone, Paraquat, Antioxidant

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