Parkinson's Disease: Assessing the Effect of a Polyphenolic Compound on Alpha-Synuclein Aggregation in Lab Afflicted Drosophila melanogaster

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Parkinson’s Disease (PD) is caused by disruption of cellular homeostasis when clusters of the protein alpha-synuclein aggregate dopaminergic neurons. However, no prescription drug directly targets the resulting fibrillization. Common medications, such as Levodopa, have adverse long term effects and cause motor response fluctuations. Polyphenolic herbal treatments, however, such as curcumin have shown promise in curtailing Parkinson’s. Curcumin itself is extracted from turmeric and has proven various benefits against neurodegenerative diseases. In this study, efficacy of curcumin in PD was investigated by assessing negative geotaxis behavior in mutant Drosophila melanogaster, which expressed a-syn oligomers with UAS control obtained through genetic engineering at the University of Indiana, Bloomington. All fly populations were transferred to Drosophila media (10% sucrose, 2% yeast, 3.3% cornmeal, 1% agar) with curcumin incorporated. Over the duration of 10 days, precise geotaxis measurements were performed to determine any reduction in locomotor impairment. Low climbing ability indicated a suspected PD-related neurodegeneration. Mutant flies treated had locomotor activity increase of 52% compared to 23% in afflicted without treatment by day 10 ($p < .05$). However, unafflicted wild types with treatment also showed mobility improvements. Utilizing afflicted and unafflicted as well as treated and untreated flies reveals the validity these findings have towards future research. In summary, the locomotor responses analyzed suggest polyphenolic compounds such as curcumin can accelerate motor improvements and decelerate protein toxicity, conceivably becoming a neoteric treatment to target the underlying cellular cause of Parkinson’s Disease.

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