

## Abstract

Parkinson's disease (PD) is one of the most common progressive nervous system disorder that effects the quality of life by producing motor dysfunction as well as non-motor manifestations. The *Anethum graveolens* (AG) commonly known as "Dill" is a culinary herb, also used as folk medicine since ancient times. The present study examines the therapeutic potential of AG leaves extract by evaluating its antioxidant activity and cognitive enhancement in Parkinsonian rotenone mice model by applying different behavioral, in vivp and in silico studies. Adult male Swiss albino mice were divided into 6 groups (n=6), i.e., group I served as control group (vehicle group), group II was treated with rotenone (2.5mg/kg) in DMSO containing sunflower oil, group III and IV were treatment groups receiving rotenone (2.5mg/kg) along with AG extract at dose levels of 200 and 400 mg/kg respectively, group V was standard group treated with Sinemet (20mg/kg), group VI was treated with AG extract 400 mg/kg once daily for 21 days. Standard behavioral tests such as open field, pole climb down, stepping test, tail suspension, stride length and beam walk were performed following dose completion. Biochemical markers of oxidative stress, i.e., LPO, CAT, GST, GSH were analyzed. Histopathological examination of H&E stained microscopic Substantia Nigra brain slides was conducted. Behavioral studies showed that the extract was effective in preventing the dysfunctions in motor coordination and balance. Histological examination showed lesser neurodegeneration in extract treated PD mice brain. Biochemical analysis revealed improved antioxidant capacities of rotenone-inflicted mice brains. Current study provides potential therapeutic benefits of *Anethum graveolens* extract, with possible future clinical applications.