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Beneficial role of Capsaicin through modulation of Mitochondrial functions in MPTP-induced mice

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Background: Parkinson's disease, is a chronic central nervous system disease that affects movement, which is characterized by progressively degradation of nigrostriatal dopaminergic neuronal cells. Even though the molecular measures resulting in the loss of dopaminergic neurons in Parkinsonism remain deceptive, some facts proposes that mitochondrial impairment could show crucial triggering events.

Aim of the study: To explore the beneficial role of capsaicin in preventing MPTP induced neurodegeneration (Mitochondrial dysfunction) in Albino Wistar mice.

Methods: Various doses of capsaicin (5 mg/kg, 10mg/kg and, 20 mg/kg) was orally given to mice once a day for 4 to 5 days after MPTP administration. Behavioural Parameters was performed in the rodents by resting tremor score, muscle coordination in rotarod, locomotor index in Actophotometer, and hole board test. On the final day of treatment i.e., 7th day, additional behaviour parameters viz. hot plate test, tail-flick test, and tail suspension test were also done. Estimation of the lipid peroxidation content which measures as malondialdehyde (MDA), reduced glutathione (GSH), catalase, superoxide dismutase (SOD), cytokines levels, Mitochondrial complexes activity, Mitochondrial Permeability Transition, and total antioxidant capacity were performed in the blood plasma.

Result: Administration of capsaicin (5 mg/kg, 10mg/kg and 20 mg/kg) doses in mice alleviated MPTP-induced behavioural, neurochemical, and histological changes in a manner comparable to levodopa. MPTP injections also substantially increased mitochondrial complexes (I, II, III and IV) activity, Mitochondrial permeability transition (change in absorbance) as compared to the control group.

Conclusion: The observed neuroprotective effect of capsaicin makes it a promising candidate for further pre-clinical and standardized clinical studies which are needed to elucidate these effects or any other mechanism of action of Capsaicin suggesting its neuroprotective effect.

Recent publications

1. Tyagi S, Shekhar N, Thakur AK. Protective Role of Capsaicin in Neurological Disorders: An Overview. *Neurochemical Research*, 2022.DOI: 10.1007/s11064-022-03549-5.
2. Tyagi S, Shekhar N, Thakur AK. An evidence-based review of Medicinal Plants in the overall management of Chronic Fatigue. *Current Psychiatry Research and Reviews*. 2021; 17(3): 154-171.
3. Kumari R, Shekhar N, Tyagi S, Thakur AK. Mitochondrial dysfunctions and neurodegenerative diseases: a mini review. *Journal of Analytical & Pharmaceutical Research*. 2021;10(4):147-149.

Biography

Sakshi Tyagi currently working on "Neuropharmacological Studies of Capsaicin for the management co-morbid brain disorders" as her Ph.D. Project from Delhi Pharmaceutical Sciences and Research University with Senior Research Fellowship from ICMR, Govt. of India. Her research area mainly involves Mitochondrial Dysfunctioning and related Brain disorders. ORCID: 0000-0003-4533-7371

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