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Comparative study on the potential role of cocoa, epigallocatechin-3- gallate, coenzyme Q10 and their combination against manganese-induced parkinsonian like syndrome in rats

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Background: The worldwide prevalence of Parkinson's disease (PD) is increasing day by day. It is the most common movement disorder which occurs due to complex interactions between environmental and genetic factors. There are strong associations between excessive exposure to Manganese (Mn) and neurodegenerative diseases characterized by extrapyramidal motor disorder similar to PD. Cocoa is a potent antioxidant and can protect cells against oxidative stress. Epigallocatechin-3-gallate (EGCG) is responsible for most of green tea's role in promoting good health with powerful antioxidant, anti-inflammatory and anti-apoptotic as well as dopaminergic neuroprotective effects. Coenzyme Q10 (CoQ10) is anti-aging and radical scavenger with effectiveness in improving cognitive disorders.

Objective: To evaluate and compare the potential effects of Cocoa, EGCG, CoQ10 and their combination against PD induced by Mn in rats.

Methods: Rats were divided to 6 groups. One group was normal and 5 groups received daily for 4 weeks MnCl₂ (10 mg/kg IP) either alone or in combination with each of the following: Cocoa (24 mg/kg PO), EGCG (5 mg/kg IP), CoQ10 (200 mg/kg PO) and their combination. Five behavioral tests were used (Grid, Bar, Swimming, Open-field and Y-maze tests). In addition, biochemical changes in monoamines, AChE, BDNF, GSK-3, Glutamate, GABA, INOS, Cox 2 as well as apoptotic, neuroinflammatory and oxidative markers were also evaluated besides histopathological examinations.

Results: Behavioral data showed that Mn induced increase in catalepsy, delay in decision making, disruption in neuromuscular co-ordination and vigilance as well as decrease in locomotor, emotionality and exploratory activities together with impairment of spatial memory. All used treatments improved most behavioral impairments however co-administration of Cocoa, EGCG and CoQ10 showed more pronounced improvements than each one alone. Biochemical and histopathological examinations in the striatum confirmed the behavioral ones. Cocoa and EGCG showed marked protection from neuronal degeneration in all brain regions than CoQ10 which still showed some nuclear pyknosis in cerebral cortex and hippocampus.

Conclusion: Neuronal degeneration as well as behavioral changes induced by Mn was partially improved either by Cocoa, EGCG or CoQ10 with superiority of EGCG and Cocoa but their combination showed more pronounced protection than each of them alone.

Biography

Azza A Ali has completed her PhD specialized in Pharmacology and Toxicology from Faculty of Pharmacy, Cairo University, Egypt. Her Postdoctoral studies included different scientific aspects especially on neurodegenerative disorders. She has also developed research line of behavioral pharmacology in Egypt. She is Member of many scientific societies such as (AAPS) and Alzheimer's Association (ISTAART). She is also Editorial Board Member of many international Journals such as *Brain Disorder & Therapy*, *Acta Psychopathologica*, *EC Pharmacology* and *Toxicology* as well as Organizing Committee Member at the 7th International Conference on Dementia & Care Practice. She has published more than 50 papers in reputed journals, supervised and discussed more than 80 PhD and MSc thesis and actively participated by oral and posters presentations at many international conferences especially on Alzheimer's disease and Dementia as Dementia Conferences 2015, 2016 and Alzheimer's Association International Conference (AAIC 2016). She has many appreciation certificates and certificate of best presentation award at 19th International Conference on Environmental Pollution and Pollution Control (ICEPPC 2017). Now she is the Head of Pharmacology and Toxicology Department at Al-Azhar University, Egypt.

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