Azza A Ali et al., J Alzheimers Dis Parkinsonism 2017, 7:5 (Suppl)
DOI: 10.4172/2161-0460-C1-031

Modulatory effects of bisphenol A, caffeine, epigallocatechin-3-gallate and their combinations against parkinsonism in rats

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Background: Parkinson's disease (PD) is the most common neurodegenerative movement disorder. It is associated with selective loss of dopamine (DA) neurons and levels in the brain leading to the appearance of motor as well as non-motor symptoms. Excessive exposure to Manganese (Mn) has been associated with increased risk of developing classic PD and manganism. Bisphenol A (BPA) is a synthetic estrogen-like substance; its exposure is almost universal and has showed neuroprotection against neuronal degeneration. Caffeine (Caf) is the most consumed psychostimulant in the world and demonstrated as a promising neuroprotective and in symptomatic treatment of PD. Epigallocatechin-3-gallate (EGCG) has known interactions with caffeine and considered as a powerful antioxidant, anti-inflammatory and anti-apoptotic with dopaminergic neuroprotective effect.

Objective: The objective of this study is to evaluate and compare the behavioral effects of BPA, Caf, EGCG and their combinations against PD induced by Mn in rats.

Methods: Rats were divided to 7 groups. One group was normal and 6 groups received daily for 5 weeks MnCl2 (10 mg/kg) either alone or in combination with each of the following: BPA (50 mg/kg), caffeine (10 mg/kg), EGCG (5 mg/kg), caffeine and EGCG and combination of all. Five behavioral tests were used (grid, bar, swimming, open-field and Y-maze tests). In addition, biochemical changes in monoamines, AChE, GSK-3B as well as excitotoxicity, 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 Caf and EGCG co-administration showed more pronounced improvements than each one alone even in the presence of BPA. Biochemical and histopathological examinations in the striatum and frontal cortex confirmed behavioral one. EGCG showed marked protection from neuronal degeneration in all brain regions than Caf which still showed some nuclear pyknosis in cerebral cortex and hippocampus.

Conclusion: Neuronal degeneration induced by Mn was partially improved with BPA. Co-administration of Caf and EGCG showed more pronounced protection than each one alone with superiority of EGCG.

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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