Parkinson's Disease Treatment with Organic Antioxidants: A Review

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Abstract

The neurological condition known as Parkinson's disease (PD) is progressive over time. It occurs as a result of the death of dopaminergic neurons. Two pathophysiological pathways for idiopathic Parkinson's disease are reactive oxygen species and complex I, which affects mitochondrial respiratory function. As a result, treating PD with natural antioxidants may offer a different treatment option that slows the disease's progression and avoids oxidative stress. In PD animal and cell line models, this review compares and discusses the outcomes of hydroxytyrosol, Ginkgo biloba, Withania somnifera, curcumin, green tea and Hypericum perforatum. The antioxidants under investigation have been shown to protect brain cells from oxidative damage in PD cell and animal models. However, there is always room for improvement and additional research regarding these phytochemicals' therapeutic value.

Keywords: Parkinson's disease • DNA • Glutamatergic agents

Introduction

Parkinson's disease (PD) is a neurological disorder that worsens with time and affects 1% of persons over the age of 65. Its yearly incidence rate ranges from 4.5 to 19.0 per 100,000 people. The primary cause of PD is dopaminergic neurons, which produce dopamine in the substantia nigra of the midbrain [1]. It is also characterised by the accumulation of protein clumps, typically made of -synuclein, as a result of the failure of protein breakdown systems like the lysosomal system.

Description

Dopaminergic neurons failing (ROS) are linked to increased microglial activity, which can result in the overexpression of pro-inflammatory cytokines and reactive oxygen species. Further evidence suggests that ROS levels may rise as a result of an enzyme complex in the mitochondria's inner membrane known as Complex I malfunctioning. The accumulation of ROS in cells causes oxidative stress, which can lead to inflammation and tissue damage. These mitochondrial abnormalities caused by oxidative stress have been linked to Parkinson's disease in animal studies.

Additionally, PD patients have significantly lower levels of glutathione in their substantia nigra cytoplasm. It has been established that glutathione acts as an antioxidant and redox regulator in the brain [2].

Neuronal cell DNA damage and elevated lipid peroxidation have been linked to oxidative damage in PD patients' brains. Because these cells are unable to deal with the abnormal protein, -synuclein, it accumulates and forms aggregates. In Parkinson's disease (PD), it is now known that mitochondrial dysfunction and aberrant -synuclein work together to cause neurodegeneration.

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To alleviate the motor impairment caused by the depletion of dopamine, the current pharmaceutical treatment for Parkinson's disease (PD) focuses on the chemical anomalies and dopamine depletion in the nigrostriatal brain cells. The majority of drugs currently available are approved for the treatment of clinical symptoms associated with Parkinson's disease. L-dopa continues to be the cornerstone of Parkinson's disease symptom management, despite the development of other treatments. Other treatments include agonists of dopamine, inhibitors of catechol-O-methyl transferase (COMT), antimuscarinic (anticholinergic) drugs, amantadine, glutamatergic agents and adenosine antagonists. Deep brain stimulation, neurorestorative therapy and ablative surgery are additional non-pharmacological treatments for Parkinson's disease (PD) [3].

Additionally, there is scant evidence to suggest that any of the available medications can halt the progression of Parkinson's disease. The hypothesis that ROS and oxidative stress are the primary causes of PD-related neurodegeneration has been the focus of recent research on neuroprotection.

As a result, we will concentrate on the research that shows the use of natural antioxidants can help prevent Parkinson's disease (PD) and alter the neurodegenerative process.

Flavonoids and diarylheptanoids, in particular, have shown antioxidant properties that could be used to treat neurological conditions caused by oxidative stress. Flavonoids, which also include flavones, isoflavones, anthocyanidins, flavonols and flavanones, are the most common phenolic phytochemicals. Herbal remedies like Ginkgo biloba, Ashwagandha (Withania somnifera), curcumin, green tea and St. John's wort (Hypericum perforatum) contain phytochemicals like flavonoids.

This study looked into the potential antioxidant properties of hydroxytyrosol, G. biloba, W. somnifera, curcumin, green tea and H. perforatum because of their accessibility as over-the-counter medications and popularity among people with neurogenerative disorders [4].

Google Scholar, PubMed, Scopus, ScienceDirect and SciFinder were used for the writing search. This survey arranged references based on writing from 1960 to 2019. Using the terms "Parkinson's disease," "neurodegeneration," "cell reinforcements," "responsive oxygen species," "polyphenols," and "flavonoids," the research question "does the cell reinforcement limit of the chosen phytochemicals have a neuroprotective impact in PD cell line and creature models" will determine the method used to identify the most significant distributions. Studies were included if they (1) depicted the cancer prevention agent properties or pharmacokinetics of the chosen phytochemicals or hydroxytyrosol, (2) were applicable to the cancer prevention agent property

impact of the chosen phytochemicals or hydroxytyrosol on creature models, or (3) were pertinent to the cancer prevention agent property impact on PD cell line models. Studies were forbidden if they were published in a language other than English and did not include one of the watchwords [5].

Parkinson's disease (PD) can be treated with medicines made from natural plant-based ingredients. This review selected hydroxytyrosol, G. biloba, W. somnifera, curcumin, C. sinensis and H. perforatum due to their accessibility as dietary supplements or complementary therapies and their high antioxidant properties.

Conclusion

Chemical tests have shown that different substances and plants have different antioxidant capacities. According to reported IC50 values, green tea crude extracts contained the most antioxidants.

Acknowledgement

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Conflict of Interest

No potential conflict of interest was reported by the authors.

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