Gene Cell Tissue. 2018 January; 5(1):e79847. doi: 10.5812/gct.79847.

Published online 2018 January 20. **Letter**

Antioxidant Effects of Olive Leaf Extract in Prevention of Alzheimer's Disease and Parkinson's Disease

Maryam Sarbishegi[1,*]

[1]Cellular and Molecular Research Center and Department of Anatomy, School of Medicine, Zahedan University of Medical Sciences, Zahedan, IR Iran

[*]*Corresponding author*: Maryam Sarbishegi, Cellular and Molecular Research Center and Department of Anatomy, School of Medicine, Zahedan University of Medical Sciences, Zahedan, IR Iran. Tel: +98-33295715-19, Fax: +98-33291124, E-mail: msarbishegi@yahoo.co.in

Received 2017 April 01; **Accepted** 2017 April 20.

Keywords: Olive Leaf Extract, Antioxidant Effects, Alzheimer's Disease, Parkinson's Disease

Dear Editor,

During the last decade some studies have focused on the important role of phenolic compounds from dietary plants in prevention and management of neurodegenerative disorders such as Alzheimer's disease (AD) and Parkinson's disease (PD).

The role of oxidative stress in development of AD and PD is well established (1) and medicinal herbs with phenolic compound have antioxidant properties are studied as disease-modifying strategies in neurodegenerative diseases. It is proposed that pretreatment with antioxidants can delay neuronal death. Olive products are full of phenolic compound and the main phenolic constitutes in olive leaf extract (OLE) are oleuropein and hydroxytyrosol (HT), which are the responsible for the therapeutic effects (2).

OLE has shown antioxidant, anti- inflammatory, and neuroprotective properties. It converts the hydrogen peroxide (H_2O_2) to H_2O and inhibits H_2O_2 accumulation and leads to cell protection, which could be of interest as a potential treatment of some neurodegenerative disease such as AD and PD (3).

Hippocampal CA1 region and dopaminergic neurons in the substantia nigra are the most vulnerable regions against oxidative stress, which respectively damage in AD and PD (4).

AD is the first common neurodegenerative disease, which is characterized by aggregation of amyloid-β peptide (Aβ) and intracellular neurofibrillary tangles, which leads to oxidative stress, mitochondrial dysfunction, and pathological cascades of events that cause cell death. Aggregation of Aβ also leads to oxidative stress and mitochondrial dysfunction (5).

It has shown that oleuropein and HT increased clearance Aβ and inhibits Tau aggregation in AD. Therapeutic role of olive leaf extract derivatives, as neuroprotective compounds has also been confirmed *in vitro* in AD models (6).

Luccarini et al., reported that oleuropein reduces deposition of Aβ and improved the cognitive performance in old rats (7).

PD is another neurodegenerative disease, which is characterized by the irreversible degeneration of nigrostriatal neurons. Dopamine metabolism and mitochondrial dysfunction are the major sources for reactive oxygen species (ROS) generation in nigrostriatal neurons, which caused neuronal dysfunction and induced development of PD (8).

Oxidative stress leads to peroxidation of the mitochondria-specific lipid cardiolipin, which induces release of cytochrome c to the cytosol and apoptosis (9).

The finding of our recent study confirmed that OLE preserved neuronal cells against Parkinson- like disease in male rats. Our results confirmed that OLE, by quenching the hydroxyl radicals, decreased lipid peroxidation and enhanced antioxidant enzyme activity in the substantia nigra of mid brain, which protects neurons from harmful effects of oxidative stress (10).

On the other hand OLE inhibited efflux of lactate dehydrogenase, which is a marker of neuronal damage, and protects neuronal cells against hypoxia-reoxygenation in rat brain slices. This finding did not report with N-acetylcysteine and vitamin E (11). Another study reported that OLE, with antioxidant properties, reduced free radicals in the skin of aged mouse and accelerated wound healing (12). In another research, we reported that OLE increased the level of GPX, SOD, CAT, and decreased MDA level in midbrain of and preserves dopaminergic cells in aged rats (13).

It has been described that HT protects neurons against oxidative stress in a Huntington disease model on rats. The obtained results revealed that HT increase antioxidant enzyme and decrease lipid peroxidation in the brain (14).

In conclusion, it seems OLE, with antioxidant effects, has a good potential therapeutic effect for prevention of neurodegenerative diseases; however, further research in humans is needed.

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