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The marvellous oregano spices

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Background

The genus *Origanum* comprises 44 species, with a number of spicy, medicinal, fragrant and ornamental plants. These are perennial, herbaceous plants.

Species from this genus are distributed from the Mediterranean region to Euroasia, and their natural habitats are rocky mountains and limestone lands.

Origanum majorana and ***O. vulgare*** are highly valued spices in cookery all over the world.

***Origanum* species** have a range of **biologically active substances** such as phenolic acids (rosmarinic acid), flavonoids, triterpenes (ursolic acid) and tannins, showing numerous promoting human health effects.

Aim

People are constantly using plants with health-boosting properties, such as oregano species, in their daily diet. Nowadays these plants, characterized as potential **functional foods**, are being extensively scientifically analyzed.

Bearing that in mind, as well as the fact that **neurodegenerative diseases** such as Alzheimer's and Parkinson's are affecting millions of people worldwide, **this study was defined to assess** the

1. antineurodegenerative,
2. antineuroinflammatory, and
3. neuroprotective potential

of ethanolic extracts of *Origanum majorana* (marjoram) and *O. vulgare* (oregano) from Serbia.

Material and methods

The plant material was obtained from
the Institute for Medicinal Plant Research “Dr. Josif Pančić”, Serbia.

O. majorana   *O. vulgare*

The extracts were prepared using classic maceration protocol and 70% ethanol as extraction solvent.

The acetylcholinesterase (AChE) and tyrosinase (TYR) inhibition were used to examine the **antineurodegenerative activity**.

Microglial (BV2) cells stimulated with LPS were used to evaluate the **antineuroinflammatory activity** in MTT, NBT, and Griess assays.

Neuronal (SH-SY5Y) cells were used to determine the **neuroprotective activity** of the extracts in MTT and Griess assays.

Results

Antineurodegenerative effects

The results suggest that **oregano extract** is slightly better at inhibiting AChE and TYR (68% *vs*. 61% at 0.1 mg/mL) than marjoram extract (53% *vs*. 59% at 0.1 mg/mL), while both of them are **more active than the positive controls** (galantamine 41% *vs*. kojic acid 25% at 0.1 mg/mL).

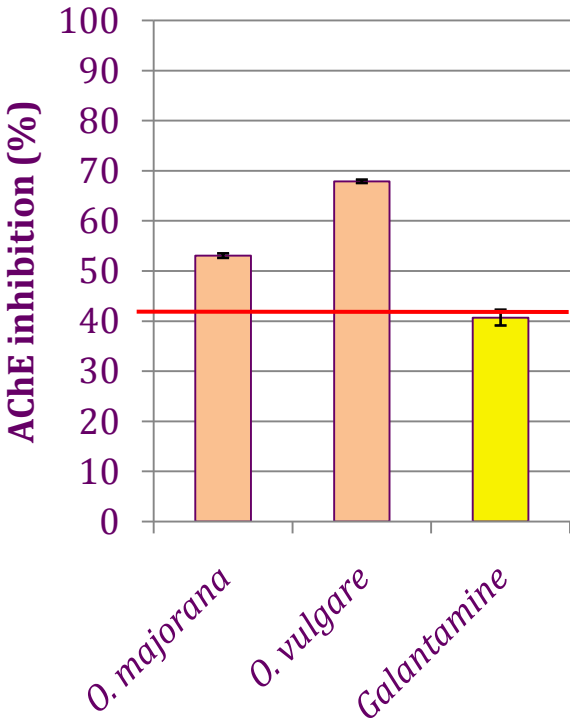

Figure 1. AChE inhibition

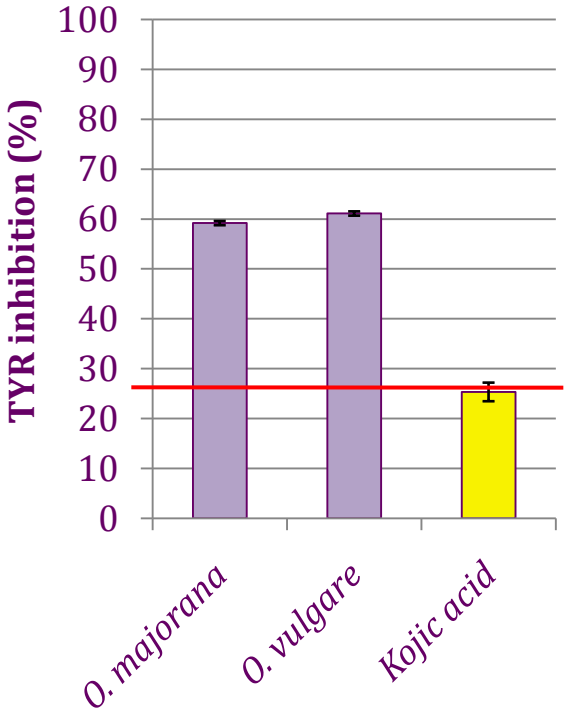

Figure 2. TYR inhibition

Results

Antineuroinflammatory effects

Both extracts normalized LPS-stimulated BV2 cells' viability while also reducing their production of inflammatory mediators, reactive oxygen species and nitric oxide (NO), to the level of untreated cells (control).

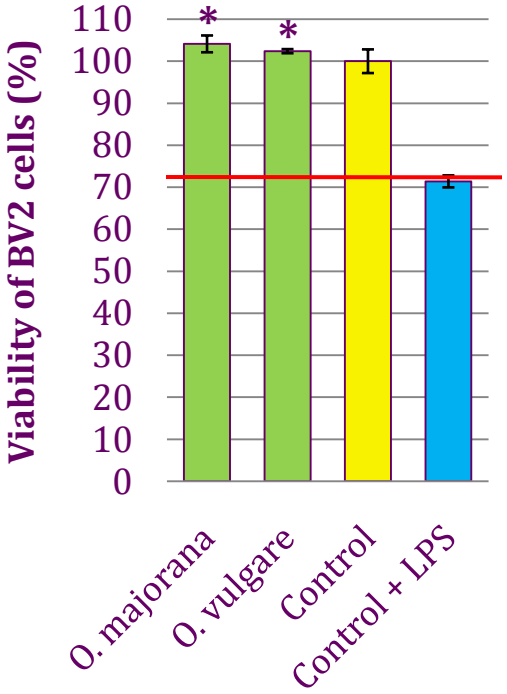

Figure 3. MTT assay

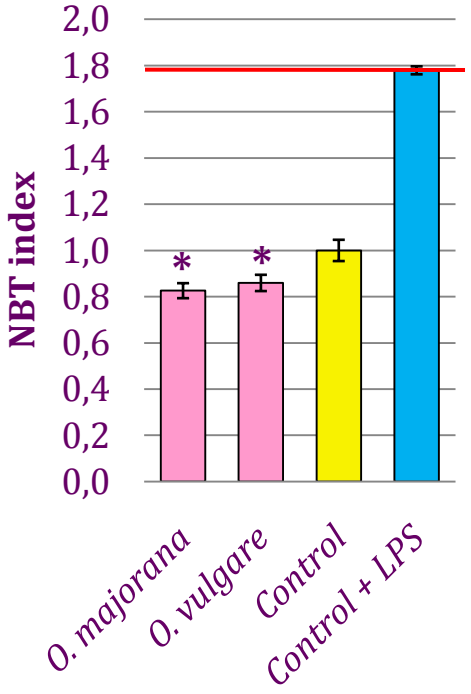

Figure 4. NBT assay

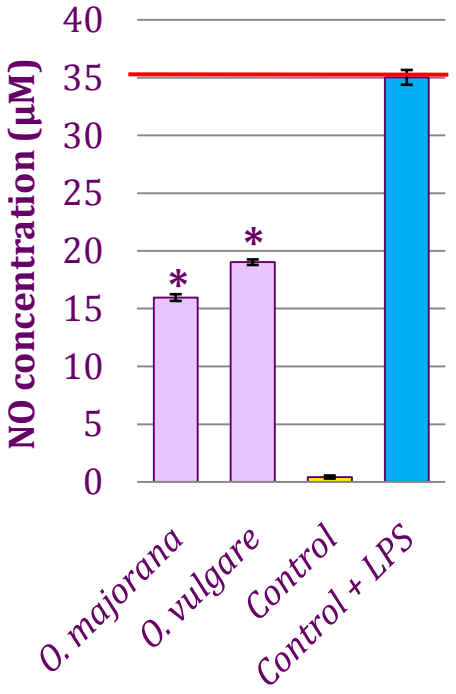

Figure 5. Griess assay

NBT index – ratio between absorbance of treated cells and untreated control - calculated on 100% viable cells

Results

Neuroprotective effects

Supernatants of LPS-stimulated BV2 cells that were previously treated with **both extracts** normalized the viability of neurons as well as their production of NO compared to the control neurons (treated with supernatants of LPS-stimulated BV2 that were not previously treated with the extracts).

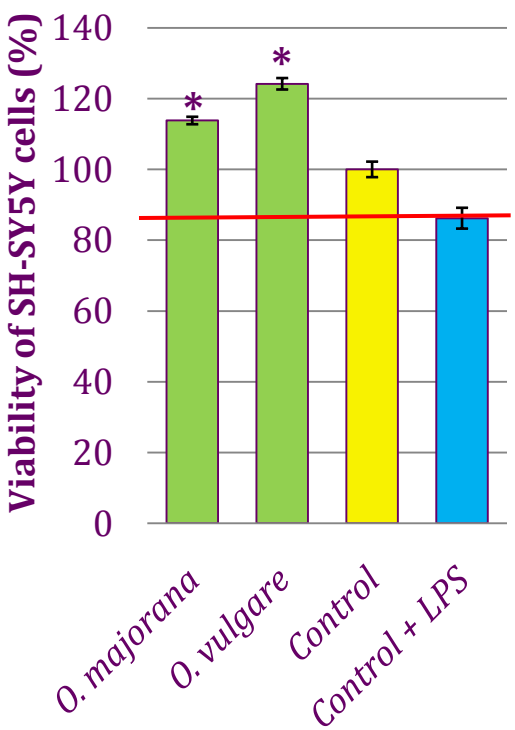

Figure 6. MTT assay

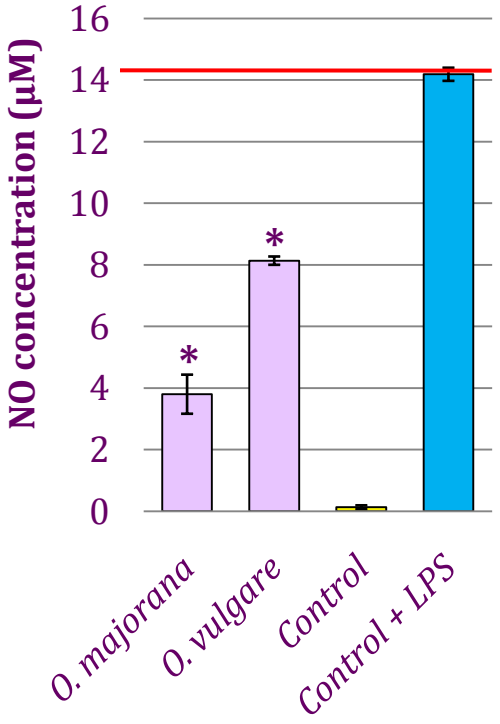

Figure 7. Griess assay

Conclusions

Both extracts exhibited noticeable antineurodegenerative, antineuroinflammatory and neuroprotective activities, representing **powerful sources of phytochemicals with promising overall neuroprotective activity**, which could be further examined for potential dietary supplement manufacturing.

Acknowledgments

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