DOI: 10.46991/JISEES.2025.SI1.186

Teucrium polium Leaf Extract as a Potential Neuroprotective Agent: Antioxidant and Anti-Inflammatory Activity in BV-2 Cell Models

Alvard M. Minasyan*, Naira Zh. Sahakyan

Research Institute of Biology, Department of Biochemistry, Microbiology & Biotechnology, Yerevan State University, 1 Alex Manoogian Str., 0025 Yerevan, Armenia

ABSTRACT

We aimed to study the antioxidant and anti-inflammatory activity of extracts from *Teucrium polium* leaves on BV-2 microglial cell line models, particularly wild-type (*Wt*) and Acyl-CoA oxidase 1 deficient ($Acox1^{-/-}$) cell line models, which are useful for examining specific neurodegenerative disorders. The analysis showed that the extract contains a high number of flavonoids and phenolic compounds. The MTT assay showed that the concentration of 0.125 mg/mL of *T. polium* extract was the highest that exhibited no toxicity. The chemical-based tests showed that the extract has high antioxidant activity. The high antioxidant potential was further verified through research using BV-2 microglial cell line models. Furthermore, the extract was detected to affect the activity of the key antioxidant enzyme catalase in both *Wt* and $Acox1^{-/-}$ BV-2 microglial cell lines. Additionally, the extract affected LPS-induced nitric oxide generation, as well as the expression of relevant genes in *Wt* and $Acox1^{-/-}$ BV-2 microglial cells, such as *Cat*, *iNos*, *Il-1β*, *Tnf-α*, and *Abcd1*. These results suggest that *T. polium* extract exerts regulatory and anti-inflammatory effects by modulating the expression levels of these genes.

Keywords: oxidative stress, enzymes, cell cultures, neurodegenerative disorders

References:

1. Sahakyan, N.; Petrosyan, M.; Koss-Mikołajczyk, I.; et al. The Caucasian flora: a still-to-be-discovered rich source of antioxidants. *Free Radic. Res.* **2019,** *53*(sup1), 1153–1162. DOI:10.1080/10715762.2019.1648799
2. Cherkaoui-Malki, M.; Bardot, O.; Lhuguenot, J.C.; Latruffe, N. Expression of liver peroxisomal proteins as compared to other organelle marker enzymes in rats treated with hypolipidemic agents. *Biol. Cell* **1990,** *69*, 83–92. DOI:10.1111/j.1768-322X.1990.tb00002.x
3. Minasyan, A.; Pires, V.; Gondcaille, C.; Ginovyan, M.; et al. *Ribes nigrum* leaf extract downregulates pro-inflammatory gene expression and regulates redox balance in microglial cells. *BMC Complement. Med. Ther.* **2025,** *25*, 49. DOI:10.1186/s12906-025-04780-7
4. Sahakyan, N.; Andreoletti, P.; Cherkaoui-Malki, M., Petrosyan, M.; Trchounian, A. *Artemisia dracunculus* L. essential oil phytochemical components trigger the activity of cellular antioxidant enzymes. *J. Food Biochem*. **2021,** *45*, e13691. DOI:10.1111/jfbc.13691

*Corresponding Author:

Alvard Minasyan, Research Institute of Biology, Department of Biochemistry, Microbiology & Biotechnology, Yerevan State University, 1 Alex Manoogian Str., 0025 Yerevan, Armenia.
Email: alvard.minasyan@ysu.am