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Ocimum Basilicum Var. Purpureum Impact on Bacterial Cell Metabolism

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ABSTRACT

The presented study investigates the antioxidant and pro-oxidant properties of ethanol extract from *Ocimum basilicum var. purpureum* (OBEE) harvested in Armenia, focusing on its radical scavenging activity, metal chelating ability, phenolic and flavonoid content, lipid peroxidation inhibition, nitric oxide (NO) modulation, tyrosinase inhibitory activity, antioxidant enzyme activity, and gene expression in *Escherichia coli* NM111 cells. The GC-MS analysis showed that the main components of *O. basilicum* extract were flavonoids (catechin, luteolin, rutin, kaempferol) and phenolic acids (caffeic acid, caftaric acid, lithospermic acid, rosmarinic acid). Total phenolic content of studied extract was investigated by Folin–Ciocalteu assay. The content for OBEE was 317.75 ± 4.105 μg GAE/mg. The total flavonoid content in OBEE was determined employing $AlCl_3$ colorimetric assay, and the value was 46.9 ± 0.884 μg QE/mg. The DPPH assay revealed significant radical scavenging activity (IC_{50} = 19.37 ± 0.38 μg/ml), comparable to the positive control catechin (IC_{50} = 13.08 ± 0.035 μg/ml). The metal chelating ability of the ethanol extract of *O. basilicum* was weakly expressed and was about 10%. Lipid peroxidation, assessed via TBARS assay, was significantly inhibited by OBEE (15.77 ± 1.5%), though less effectively than α-tocopherol (91.1 ± 1.9%). Unexpectedly, OBEE increased NO levels in *E. coli* cells 2.6-fold, demonstrating pro-oxidant activity. The tyrosinase inhibitory activity value of OBEE was 4.7 ± 0.2%. The study showed that the activity of SOD and catalase in *E. coli* cells increased under the influence of ethanol extract of the studied plant 12% and 30%, respectively. Additionally, OBEE induced the expression of the *katG::lacZ* gene fusion by 1.27-fold, with further induction observed under oxidative stress. Thus, OBEE contained high level of polyphenols and in aerobic conditions exhibited prooxidant features in *E. coli* cells, thereby accounting for the antibacterial activity of these extract components.

Keywords: *O. basilicum*, *Escherichia coli*, phenol, flavonoid, SOD, catalase

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