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Evaluation of phytochemical, antioxidative and antibacterial activities in *Hypericum perforatum* L. callus cultures

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Background. *Hypericum perforatum* L. and *Ginkgo biloba* L. are two examples of top-selling plants that have been cultivated by European and American phytopharmaceutical companies for many years [1]. Medicinal plant biotechnology could enhance the formation and accumulation of desirable natural products and develop new and effective pharmaceuticals. *Hypericum perforatum* L. extracts accumulate phytochemicals such as flavonoids, biflavones, phenolic acids, naphthodiantrone derivatives, and phloroglucinols. These extracts are known to have antidepressant, antidiabetic, antioxidant, antibacterial, antiviral, and anticancer activities [2]. The main aim of the present study was to investigate the antioxidant and antibacterial activities of *Hypericum perforatum* L. phytochemicals in callus culture extracts. **Methods.** Callus cultures of *Hypericum perforatum* L. were obtained *in vitro* using different MS media supplemented with 1-naphthylacetic acid (NAA), 2,4-dichlorophenoxyacetic acid (2,4-D), 3-indolylacetic acid (IAA), 6-benzylaminopurine (BAP), and thidiazuron (TDZ). The antioxidant activity of methanol extracts of callus culture were determined using DPPH, FRAP, and reducing power assays. The Kirby-Bauer agar diffusion susceptibility test was used to determine the antibacterial activity against *E. coli* and *B. subtilis* [2]. **Results.** A detailed analysis of the antioxidant properties showed that *Hypericum perforatum* L. callus cultures grown in MS medium with NAA (0.1 mg/L), BAP (0.2 mg/L), and 2,4-D (0.5 mg/L) additives possessed the highest antioxidant activity. *Hypericum perforatum* L. callus cultures grown in MS medium with TDZ (0.5 mg/L) and IAA (0.1 mg/L) added had the highest concentrations

of chlorophyll *a* and *b*, and carotenoids. Evaluation of superoxide dismutase activity showed that *Hypericum perforatum* L. callus cultures grown in MS medium with TDZ (0.5 mg/L) and IAA (0.1 mg/L) had the highest effect on the synthesis of antioxidant enzymes. It was found that extracts from *Hypericum perforatum* L. callus cultures grown in MS medium with BAP (1 mg/L) and 2,4-D (1 mg/L) had the highest antibacterial activity against *E. coli* and *B. subtilis* bacterial cultures. **Conclusions.** The results suggest that the addition of the phytohormones TDZ (0.5 mg/L) and IAA (0.1 mg/L) to the MS medium is a suitable method to promote the formation of bioactive secondary metabolites in *Hypericum perforatum* L. callus cultures.

Keywords: callus cultures, *Hypericum perforatum*, phytochemicals, antioxidants, antibacterial activity.

REFERENCES

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