Antioxidant activity, anti-proliferative activity, and amino acid profiles of ethanolic extracts of edible mushrooms

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Received June 15, 2016
Accepted August 4, 2016
Published October 17, 2016
DOI http://dx.doi.org/10.4238/gmr15048886

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**ABSTRACT.** Biological activities of various mushrooms have recently been discovered, particularly, immunomodulatory and antitumor activities. Herein, three edible mushrooms, *Auricularia auricula-judae* (AA), *Pleurotus abalonus* (PA) and *Pleurotus sajor-caju* (PS) extracted using Soxhlet ethanol extraction were evaluated for their antioxidative, anti-proliferative effects on leukemia cells. Using the Folin-Ciocalteau method and Trolox equivalent antioxidant capacity assay, phenolics
and antioxidant activity were found in all sample mushrooms. Additionally, anti-proliferative activity of mushroom extracts against U937 leukemia cells was determined using a viability assay based on mitochondrial activity. PA (0.5 mg/mL) and AA (0.25-0.5 mg/mL) significantly reduced cell viability. Interestingly, PS caused a hormetic-like biphasic dose-response. Low doses (0-0.25 mg/L) of PS promoted cell proliferation up to 140% relative to control, whereas higher doses (0.50 mg/mL) inhibited cell proliferation. Against U937 cells, AA IC₅₀ was 0.28 ± 0.04 mg/mL, which was lower than PS or PA IC₅₀ (0.45 ± 0.01 and 0.49 ± 0.001 mg/mL, respectively). Furthermore, lactate dehydrogenase (LDH) leakage conferred cytotoxicity. PS and PA were not toxic to U937 cells at any tested concentration; AA (0.50 mg/mL) showed high LDH levels and caused 50% cytotoxicity. Additionally, UPLC-HRMS data indicated several phytochemicals known to support functional activities as either antioxidant or anti-proliferative. Glutamic acid was uniquely found in ethanolic extracts of AA, and was considered an anti-cancer amino acid with potent anti-proliferative effects on U937 cells. Collectively, all mushroom extracts exhibited antioxidant effects, but their anti-proliferative effects were dose-dependent. Nevertheless, the AA extract, with highest potency, is a promising candidate for future applications.

**Key words:** *Auricularia auricula-judae; Pleurotus abalonus; Pleurotus sajor-caju; Antioxidation; Anti-proliferation; Amino acid profiles*