

Evaluation of Cytotoxicity on Human Cancer Cells, Antioxidant and Immune Cell Activities of Extracts of *Codonopsis lanceolata* Roots Stored at Different Temperatures and for Different Durations

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[Introduction]

C. lanceolata is widely consumed in South Korea; however, its medicinal applications have not been explored. Recently, plants and plant-derived products have become a part of the healthcare system, with the increasing use of bioactive phytochemicals. Studies have shown that the traditional medicinal plants have in vitro mutagenic, toxic, and carcinogenic properties. The present study, therefore, aimed to evaluate the XO inhibitory activity, reducing power, immune activity, and cytotoxicity of 30% ethanolic extracts of *C. lanceolata* roots stored at various temperatures and for different durations.

[Materials and Methods]

Immune enhancement effect of the extracts was assayed according to the method of Lee et al. (2004) using T and B cells. The XO inhibitory activity was measured spectrophotometrically by the method of Noro (1983). The reducing power of the extract was determined by the modified method of Oyaizu (1986). The cytotoxicity of *C. lanceolata* extracts was assayed using human cancer cell lines, including HeLa, Calu-6, and MCF-7 for human cervical carcinoma, pulmonary carcinoma, and breast adenocarcinoma, respectively.

[Results and Discussions]

The growth of human T and B cells increased when treated with the extracts of roots stored at low temperatures for a short period; their growth was promoted in a concentration-dependent manner. The XO inhibitory activity tended to decrease significantly with increase in storage period and storage temperature of roots. The reducing power of the extracts increased significantly in a concentration-dependent manner; however, when the root storage temperature was > 30°C, the reducing power of the root extract tended to decrease significantly. The cytotoxic effect of the extracts against human cancer cell lines was higher when the storage temperatures were < 25°C; in particular, the cytotoxic effect on the MCF-7 cell line was relatively higher than that on the HeLa and Calu-6 cell lines. The results suggest that the root extract of *C. lanceolata* can be used to modulate immune response, and is also a natural food additive with excellent physiological functionality.

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