

Bioactivities and Chemical Characterization of the Wild Mushrooms of Nepal

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論 文 内 容 の 要 旨

Mushrooms have been considered a part of a healthy human diet due to its high nutritional benefits and potential medicinal properties. Nepal, is a country rich in biodiversity with abundant natural medicinal resources, including various medicinal mushrooms. However, there is a great lack of scientific research into the bioactivities and chemical characterization of these mushrooms. The present study aims to fill this gap by investigating bioactivities of several wild mushroom species, collected from the forests in different parts of Nepal. Ninety-two samples of wild mushrooms, belonging to 40 different genera were collected from forests in different parts of Nepal (altitudes ranging from 1300 m to 3800m). The samples were dried and sent to Systematic Forest and Forest Product Sciences, Kyushu University, for analysis. The samples were firstly identified based on the morphological characteristics, followed by genetic identification.

The dried samples were ground to a fine powder, and extracted in ethanol and water separately at room temperature for 24 hours. The assays such as total phenol content (TPC), ORAC, DPPH, ABTS, and reducing power were used to test the antioxidant activity. Other tested bioactivities include antibacterial activity against *Staphylococcus aureus* and *Propionibacterium acnes*, inhibitory and stimulatory activity towards melanin synthesis in B16 melanoma cells, anti-allergy activity in RBL-2H3 cells, and anti-cancer activity using the cancer cell lines MCF-7, Hela, HCT-116, HepG2, CCD-841, and NHDF.

Although several species were identified as bearing strong bioactivities, the mushrooms belonging to the Hymenochaetaceae family were some of the most prominent samples. Ethanol extract of *Inonotus clemensiae* showed extraordinarily high values of antioxidant activity (ORAC value 31,966.9 μ M trolox equivalent/ g extract), which is one of the highest reported antioxidant activity among food products. Further chemical characterization of this extract by LC-MS and NMR analysis revealed the presence of a highly bioactive compound, “hispidin”. However, the presence of the compound as a single major compound, encompassing around 70% of the extract is a very unique phenomenon. Some other interesting samples with strong bioactive potential were *Cyclomyces setiporus*, *Phellinus conchatus*, and several *Ganoderma* sp. Compounds such as protocatechualdehyde, protocatechuic acid, homovanillic acid, and vanillin were identified from *Cyclomyces setiporus*.

The next step was to focus on the *in vitro* digestion of the bioactive compound hispidin, to confirm the maintenance of bioactivity upon consumption. A two-step process involving the enzymatic and fecal microbial digestion was performed to analyze the effect on the compound. Further experiments are being conducted to clarify this effect and explore the possibilities of biotransformation. Overall, the present research is expected to highlight the bioactive potential of the wild mushrooms of Nepal, opening possibilities to create economic benefits for the local farmers.