

Can Medicinal Mushrooms Fight Against SARS-CoV-2/COVID-19?

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The power of mushrooms as medicine was recognized nearly two thousand years ago. They are nature's miniature pharmaceutical factories, rich in a vast array of novel constituents and wide open for exploration.

Reishi mushroom, also called "the mushroom of immortality" yields miraculous health benefits and contains over 400 bioactive compounds, which have a number of medicinal effects. More than 150 novel enzymes have been identified from mushroom species so far [1, 2].

Medicinal *Basidiomycetes* mushrooms (including reishi mushroom, almond mushroom, pom pom mushroom and maitake mushroom) are usually consumed in China, Japan, Thailand and Korea as immune response modifiers for prevention of cancer, or as nutritional support during chemotherapy, and for

chronic inflammatory conditions such as hepatitis and other diseases.

According to Scandinavian Journal of Immunology, medicinal *Basidiomycetes* mushrooms would have merit as prophylactic or therapeutic add-on remedies in COVID-19 infection, as well as for the immune overreaction and damaging inflammation that occurs with COVID-19 attack [3].

A Thailand-based research group, supported by Chulalongkorn University of Bangkok, recently revealed six low-toxic/non-toxic compounds in mushrooms having SARS-CoV-2 protease inhibitory activity [4].

Chaga mushrooms (grows mainly on the bark of birch trees in Northern Europe, Siberia, Russia, Korea, Northern Canada and Alaska) possess a

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powerful enzymatic system and a strong system of defense, due to their parasitic mode of life. They have shown promising results in attenuation of inflammatory responses that has been associated with COVID-19—as reviewed by a research team from University of Bradford, UK [5].

Beta-glucans are sugars that are found in the cell walls of certain saprophytes, lichens, and plants, most commonly used for heart disease and high cholesterol. β -glucans from the edible shiitake mushroom show protective response to a wide range of viral infections and may potentially reduce key cytokines involved in cytokine storm experienced in severe cases of COVID-19 [6].

Recent studies show that selenium and zinc play particular roles in cardiovascular conditions, suggesting their beneficial roles against COVID-19. When biofortified, dried fruiting bodies of reishi mushroom may serve as a nutritional source of these essential elements [7-10].

Presently medicinal mushrooms are mainly used as dietary supplements or functional food. Special precautions should be there, like cooking procedure, amount to consume, source of collection and most importantly hypersensitivity (allergy) of individual person before consumption. Nevertheless, they have the potential to become real drugs from medicinal plants. Also, to explore them as dietary supplement, preclinical and clinical trials and legal authorization are necessary.

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