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Mushroom as Potential Immunity Enhancer

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Abstract

Mushrooms belong neither to the plant nor animal kingdoms, and they actually share more DNA with animals that they do with plants. There are approximately 1,40,000 species of mushroom-forming fungi in the world, but science is only familiar with about 10%, while only 100 species or so are being studied for their potential health benefits and medicinal applications. Some of the popular medicinal mushroom varieties are *Coriolus versicolor* (Turkey Tails), *Ganoderma lucidum* (Reishi), *Agaricus blazei*, *Polyporus umbellatus*, *Hericium erinaceus* (Lion's Mane).

Introduction

Mushrooms comprise many medicinal possessions have been recognized since thousands of years to produce biometabolites which are exploited as potential treatment for numerous ailments (Ramniwas Yadav, 2020). Mushrooms are an ideal low-energy diet for diabetics. They contain natural insulin and enzymes which help the breaking down of sugar or starch in food. They are also known to contain certain compounds which help proper functioning of the liver, pancreas and other endocrine glands, thereby promoting the formation of insulin and its proper regulation throughout the body. The health benefits of mushrooms include relief from high cholesterol levels, breast cancer, prostate cancer, and diabetes. It also helps in weight loss, and increases the strength of our immune system. These properties have attracted the interest of many pharmaceutical companies, which are viewing the medicinal mushroom as a rich source of innovative biomedical molecules.

Coriolus versicolor (Turkey Tails)

Coriolus versicolor (multicolored mushroom), also known as *Trametes versicolor*, is the most commonly found polypore in the oak woods of the Pacific Coast in the US. It grows in clusters or tiers on fallen hardwood trees and branches, frequently in large colonies. As its name implies, it is often multi-colored, with contrasting concentric bands, variously appearing in shades of white, gray, brown, black, blue or even red. It has a thin, velvety fruiting body, usually 2-7 cm wide, fans out into wavy rosettes, giving rise to its popular name, Turkey Tails. It emits a warm, brown, cinnamon-esque color from its velvety cap.

Uses

Anti-cancer action: Turkey tail is an herbal medicine that can aid the fight against cancer, as well as attack viruses that lay at the roots of many different types of cancers. It has been shown to be effective against cervical cancer, in combination

with other therapeutic agents; appears to enhance the effect of radiation therapy. It significantly lessened the side effects of conventional medical protocols used in the treatment of cancers of the esophagus, stomach and lungs, as well as significantly increasing the rate of remission in esophageal cancers.

It apparently promotes the production of natural disease-killing white blood cells, which help the body fight tumorous cells. These same white blood cells also help to combat the HPV virus, which is a root cause of cervical cancer, as well as the hepatitis C virus, which can trigger the formation of liver cancer.

Cardiovascular health: It lowered the cholesterol in animal studies.

Immune enhancement: It increases interferon production, as well as scavenging superoxide and hydroxyl free radicals, showed anti-viral activity, possibly even inhibiting HIV infection.

***Ganoderma lucidum* (Reishi)**

G*anoderma lucidum* (shining skin) is a visually striking polypore with a hard woody texture and a shiny, varnished appearance. It primarily grows on oaks, plum trees and other hardwoods, and has a 2-20 cm semi-circular or kidney-shaped cap, variously colored white, yellow, blue, red, purple or black. *Ganoderma* species are found worldwide, though the Chinese and Japanese species have been studied the most extensively for their therapeutic value. Reishi is known in Chinese medicine as a tonic herb, meaning it can be consumed in large and regular quantities without causing adverse side effects, much like food. It is often advised to take Reishi mushroom for long periods of time to allow it to take its full effect (Mahajna, 2008).

Uses

Athletic performance: Enhances oxygenation of the blood, reducing and preventing altitude sickness in high altitude mountain climbers.

Cardiovascular health: Lowers cholesterol levels, reduced blood and plasma viscosity.

Immune enhancement: Potent action against sarcoma, stimulates macrophages and increases levels of tumor-necrosis factor (TNF- α) and interleukins. Largely behind reishi's medicinal qualities is a complex carbohydrate known as polysaccharides, which have been studied extensively and are proven effective for battling tumors, as well as modulating the immune system.

Immunopotential: Anti-HIV in *in vitro* and *in vivo* animal studies; protects against ionizing radiation.

Liver health: Reduced liver enzyme levels (SGOT and SGPT) in hepatitis B patients.

Respiratory health: Regenerates bronchial epithelium.

Reishi is useful for many ailments. It calms anxiety, and is used as a general tonic. It is anti-allergenic and antiviral, and is used for hepatitis and heart arrhythmias. Reishi can also be used as an antidote for poisonous mushrooms.

***Polyporus umbellatus* (Zhu Ling)**

P*olyporus umbellatus* ("umbrella-like polypore"), also known as *Grifola umbellata*, is a white-to-gray mushroom that grows in dense rosettes from a single stem. It is found in deciduous woodlands in China, Europe and Eastern and Central North America, growing from dead tree stumps or the roots of birches, maples, beeches and willows.

Uses

Anti-cancer actions: Used in the treatment of lung and other cancers; has demonstrated pronounced anti-tumor activity in *in vitro* and *in vivo* animal studies; helps reduce the side-effects of chemotherapy.

Immune enhancement: Stimulates and enhances the performance of the immune system and accelerates production of IgM and strengthens the power of monocytes.

Liver health: Can help alleviate symptoms of chronic hepatitis.

***Hericium erinaceus* (Lion's Mane)**

H*ericium erinaceus* (spiny hedgehog) is a snow-white, globe-shaped fungus composed of downward cascading, icicle-shaped spines. Its striking appearance gives rise to its various common names, Lion's Mane, Monkey's Head and Hedgehog Fungus. It grows up to 40 cm in diameter on dead or dying broadleaf trees such as oak, walnut, maple and sycamore and is found in China and Japan, as well as parts of Europe and North America. It is considered as a gourmet mushroom, long popular with forest folk, with a flavor variously described as reminiscent of lobster or eggplant.

Uses

Anti-cancer effects: Helps in the treatment of esophageal and gastric cancers and extend the life-span of cancer patients.

Digestive enhancement: Promotes proper digestion; effective against gastric and duodenal ulcers and gastritis.

Immune enhancement: Protects the gastrointestinal tract against environmental toxins, inflammation and tumor formation, an extract was used as part of a protocol that helped increase T and B lymphocytes in mice.

Cordyceps sinensis

C*ordyceps* has a long history as a tonic herb applied in both Chinese and Tibetan medicine. It grows at high-altitudes of over 3,800 meters above sea level in the mountainous Himalayas, where it is known as yarsa gumba.

Uses

Folk healers in Sikkim use the fungi to treat a plethora of ailments including cancer, diabetes, asthma and erectile dysfunction. Modern scientific research is starting to confirm their intuitions with regard to the fungi's healing properties. Polysaccharides are once again a key healing ingredient in cordyceps. It also contains beneficial fatty acids, amino acids and sterols. In animal studies, *Cordyceps* demonstrated anti-tumor, anti-diabetic, radio-protective and anti-platelet effects. Another interesting property of *Cordyceps* is its proven ability to enhance exercise and athletic performance, and resistance to fatigue.



Figure 1: *Coriolus versicolor*



Figure 2: *Ganoderma lucidum*

***Lentinula edodes* (Shiitake Mushrooms)**

The shiitake mushroom is found on fallen broadleaf trees such as chestnut, chinquapin, beech, oak, maple, and walnut. It is a potent immune-boosting mushroom; has antitumor and antiviral properties; lowers blood pressure and cholesterol. It is used medically for any and all diseases involving depressed immune function, including cancer, AIDS, environmental allergies, candida infections, and frequent flu

and colds. Shiitake has high levels of calcium, vitamin B2, and vitamin C. It is the second-most widely cultivated mushroom after the common white button mushroom (*Agaricus bisporus*) (Pieroni, 2005).



Figure 3: *Polyporus umbellatus*



Figure 4: *Hericium erinaceus*



Figure 5: *Cordyceps sinensis*



Figure 6: *Lentinula edodes*

Conclusion

Mushrooms are a good source of iron and over 90% of the nutritive iron value can be absorbed by the body, which promotes the formation of red blood

cells and keeps people healthy and functioning at their full potential. Mushrooms are a rich source of calcium, which is an essential nutrient in the formation and strength of bones. Mushrooms contain natural antibiotics (similar to penicillin, which itself is extracted from mushrooms), which inhibit microbial growth and other fungal infections.

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