



Medicinal properties of mushrooms: a review

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ABSTRACT

Since antiquated time's plants just as parasite wellsprings of restorative mixtures have kept on assuming a prevailing part in support of human wellbeing. The population of India is growing at a very faster pace. It has been estimated that the population of India would be around 250 million by 2050 and will be among the poorest country in the world due to the population growth and not satisfying the food demand of the population. Apart from this the people will have to also deal with a lots of diseases as there will be scarcity of medical facilities. There would also be problem of malnutrition among the children. As a result of which we have to search for the alternative nutritional source for the growing population. Non green revolution which is also called as mushroom farming will be among the appropriate ways to meet this challenge because the mushroom does not requires any additional land as it would totally grows on the waste materials next to its nutritional and medicinal properties. Belonging to the order of basidiomycetes or ascomycetes they have cell supplementing properties as well as antimicrobial properties. Overall they are a good nutritional source for all the human kinds.

Keywords: Ascomycetes, Antimicrobial, Anticancer, Basidiomycetes

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INTRODUCTION

The total population is expanding day-by-day. At present, it is viewed as almost 7 billion. A few speculations propose that by the year 2050, the worldwide population will reach to 9 billion, also, during 2100, it very well may be 20 billion. Lack of food and decay in human wellbeing will be consuming issue due to the population development and urbanization, with an associative decrease in arable land. Penicillin, maybe the most renowned of every single anti-toxin drug, is gotten from a typical fungus called *Penicillium* [9].

Numerous different organisms additionally produce anti-microbial substances, which are presently generally used to control infections in human and animal population. Different species known uniquely for their medicinal properties incorporate *Ganoderma*, *Trametes*, and so on As they are rough and hard in texture, they have a severe. Mushrooms are improved in nutrients like Ascorbic acid, Biotin, Niacin, Riboflavin and thiamine [15].

Apart from these nutrients ,Vitamin A and D square measure once during a whereas found, but there square measure likewise many animal teams that contain perceptible nutrient D after they square measure conferred to actinic radiation beams. Unsavory fat substance of mushroom involves lipids such as mono, di, and greasy oils, sterols, phospholipids. In the current timeframe, restorative mushrooms square measure being fastened certain finding such mixtures that might amendment the response of immune cells [3, 4].

Consequently on these lines, they may be vital for vivifying and rising the natural response of safe structure. Also, later on they might be utilised for the treatment of growth and alternative immunological disorder standing on as a combination with against contamination specialists equally as vaccination adjuvant just in case of immunological disorder development, they could be utilized in airtight framework infections. As imparted prior, being advancements, mushrooms contain a blend of constituents that have a lot of exercises just as cell fortress improvement, anti-infective movement, dangerous neoplasm action, similarly as revision of safe design [8].

In the current situation the principle centre is being given around the medicinal mushroom since they contain such mixtures in them that would be useful in tweaking the reaction of the invulnerable cells. As a consequence of which it will be useful in animating and upgrading the organic reaction of the safe system.

Also, in this way they could be used for the treatment of tumor and other immunodeficiency status along as a blend in with serums harms comparably as neutralizing specialist adjuvant [19, 23].

A portion of the key significant properties of medicinal mushrooms are talked about in a word:

CELL REINFORCEMENT PROPERTY

Specialists found that mushrooms contains a cell reinforcement substance that could forestall the dangerous oxidative interaction inside the organism. One of the main pretended by oxygen is in the natural framework that incorporate supplement utilization, transport of electrons for creation of ATP and furthermore the evacuation of undesired chemicals from the body.

Phellinus rimosus

This specific mushroom species is generally found on the planins and the tropical timberland region. It had been reported in the Chinese medication that the heated water concentrates of the fruiting assemblage of *Phellinus spp.* fix numerous infirmities and furthermore revive human body and advances longevity. The various concentrates of *Phellinus spp.* are found to rummage Oxygen, Hydroxide, Nitric oxide extremists which are created from free revolutionaries when the investigation was led under invitro conditions [1].

Ganoderma sp.

The history of *Ganoderma sp.* is very old. The different chemical compounds which are found in *Ganoderma*, phenolics and other phyto-constituents efficiently scavenge the Oxygen and OH radicals which were generated experimentally when studied under *in-vitro* conditions as a result of which they have antioxidant and chelating activities along with reducing power and chelating abilities (Table 1) [15].

Agaricus bisporus

It is quite possibly the most developed species in the world. It is usually known as catch or table mushroom. It fills widely in Europe and North America. Concentrate of *A. bisporus* (in bubbled or in crude structure) is a lot of compelling due to the presence of cancer prevention agents in it which adequately repress the oxidative emergency in invitro tests [12].

Pleurotus species

It is an eatable and furthermore widely developed mushroom among the others. There are numerous types of the *Pleurotus* mushroom are there that contains cancer prevention agents, anti-inflammatory and likewise anti-tumour mixtures [6]. *P. florida* is having methalonic remove which is acquired from the fruiting body of the mushroom having OH extremist searching movement and lipid peroxidation hindering exercises [10].

ANTIMICROBIAL ACTION

The concentrates which is gotten from the mycelium and the fruiting body of the organism have antimicrobial property against a wide scope of irresistible microorganisms [11].

***G. annulare* and allied species**

Applanoxidic corrosive secluded from *G. annulare*, Glibn show feeble antifungal movement against trichophytonmentagrophytes. *G. applanatum* [Pers.] Pat., contains steroidal mixtures like 5 α -ergosta-7,22-dien-3 β -ol or 5,8-epidioxy-5 α ,8 α -ergosta 6,22-dien 3 β ol which is compelling against various gram positive and gram negative microorganisms [20].

Lentinula edodes

This mushroom contains oxalic corrosive which have antimicrobial impact against *Staphylococcus aureus* and different microorganisms as well. The mycelium of *Lentinula edodes* likewise contains Ethanolic extricate which shows antiprotozoal action against *Paramecium caudatum* [5].

ANTICANCER PROPERTY

There are a few types of mushrooms are there which are having the mixtures in them which limits the tumor activities. Consumption of practically all the consumable mushrooms, particularly the white catch mushroom can keep from prostate and bosom cancer. Chemicals like 5 α -reductase and aromatase are liable for the development of malignant tumors. One of the main disease drug is Polysaccharide-K (Kresin) which is detached from *Trametes versicolor* (*Coriolus versicolor*). Some mushroom inferred polysaccharides are there which decreases the results of radiotherapy and chemotherapy also. For model *Lentinula edodes*, *Trametes versicolor*, *Agaricus bisporus* and others [14].

A few types of mushroom which shows anticancer properties are:

Phellinus linetus

It is a restorative mushroom that has a place with Basidiomycota and are found in America, Africa and Asia. Polysaccharides are detached from this mushroom which is the organic dynamic compound. The different polysaccharides are likewise present like-acidic proteo-heteroglycans with blended α , β linkage,

and a [1-6] - spread sort [1-3]-glycan. These polysaccharides are mostly answerable for the immune-stimulatory and antitumor exercises [21].

Agaricus bisporus

The polysaccharide that is found in this mushroom is monetarily advanced as a dietary upgrade for use as an immune-stimulating trained professional and kidney tonic. The utilization of catch mushroom can diminish the danger of chemical ward bosom disease in women. One of the primary preferred position is that this mushroom is promptly available, affordable and acknowledged worldwide to individuals [16].

Grifolafrondosa

The mixtures B D Glucan and glycoprotein edifices have solid antitumor exercises in xerographs. β -glucan [β -1, 6 glucan extended with a β -1, 3-linkage] has huge immunomodulating and antitumor exercises in creature models, and is orally bioavailable [17].

Anti-aging property

The polysaccharides that are available in the mushroom are the intense foragers of superoxide free radicals. These cancer prevention agents stops the activity of the free extremists in the body, which brings about lessening the maturing process. A explicit antioxidant which is found in *Flammulinavelutipes* and *Agaricus bisporus* is "Ergothioneine" which is vital for healthyeyes, kidney, bone marrow, liver and skin [14].

Immunomodulator activity

Huge number of polysaccharides are there (beta glucans) and minerals that are secluded from mushroom are chiefly liable for the upregulating the insusceptible system. Generally the polysaccharides are T-lymphocyte subordinate antigens that doesn't inspire the cell interceded safe response. In the human body the resistant framework assumes a significant part in the safeguard against diseases and tumors (Table 2). Because of the presence of various bioactive polysaccharides assumes a significant part in immunomodulation [18].

Some mushroom species which shows this action is-

Lentinusedodes

L. edodes mycelium concentrate and lentinan are the two significant mixtures which are essentially gotten from this mushroom. Lentinan acts by delivering its antitumor impact by initiating distinctive safe reactions in the host [2].

The fundamental explanation for this immunomodulation is maturation, proliferation and separation of the cells which are associated with the host safeguard mechanism. So the lentinan will expand the host obstruction against the different disease and furthermore can possibly re-establish the invulnerable arrangement of the tainted people.

A) Lentinan can restrain prostaglandin amalgamation, which can moderate T cell separation in creatures and people, just as repressing silencer T cell movement *in-vivo*. [22].

B) Lentinan is additionally answered to increment in the initiation of nonspecific inflammatory reaction, for example, intense stage protein creation [13].

C) It additionally upgrades vascular enlargement and discharge instigating factor *in-vivo* [7].

Table 1: Medicinal values of some important mushrooms:

S. N.	Mushroom	Compound	Medicinal properties
1.	<i>Agaricus bisporus</i>	Lectins	Enhance insulin secretion
2.	<i>Auricularia auricular</i>	Acidic polysaccharides	Decrease blood glucose
3.	<i>Cordyceps sinensis</i>	Cordycepin	Cure lung infections, hypoglycemic activities, cellular health properties, antidepressant activity
4.	<i>Flammulinavelutipes</i>	Ergothioneine Proflamin	Antioxidant Anticancer activity
5.	<i>G. frondosa</i>	Polysaccharide lectins	Increase insulin secretion Decrease blood glucose
6.	<i>Ganoderma lucidum</i>	Ganoderic acid	Augment immune system Liver protection
		Beta glucan	Antibiotic properties, inhibits cholesterol synthesis
7.	<i>Lentinula erodes</i>	Eritadinelentinan	Lowers cholesterol Anti cancer agent
8.	<i>P. sajor-caju</i>	Lovastatin	Lowers cholesterol
9.	<i>Trametes versicolor</i>	Polysaccharide - K(Kresin)	Decrease immune system depression

Table 2: Palatable and non-edible mushrooms and their exercises:

S. No.	Mushrooms	Activities
1.	<i>Agaricus bisporus</i>	Enhances natural killer cell activity
2.	<i>Coriolus versicolor</i>	AntiHIV
3.	<i>Ganodermalucidum</i>	Antiallergic Angiotensin Changing over chemical inhibitors Cancer prevention agent and free extremist searching
4.	<i>Grifolafrondosa</i>	Anticancer and hypoglycemic effects.
5.	<i>Hygrocybe spp.</i>	Chelating impact,iron and calcium substance
6.	<i>Hygrophorus spp.</i>	Iron and calcium substance
7.	<i>Hypsizigumarmoreus</i>	Antifungal and antiproliferative exercises.
8.	<i>Lactariusvellereus</i>	Antigenotoxic exercises.
9.	<i>Lentinula edodes</i>	Antimutagenic effects
10.	<i>Piptoporusbetulinus</i>	Anti-inflammatory and antihyaluronatelyase activities.
11.	<i>Pleurotus ostreatus</i>	Lowers cholesterol levels
12.	<i>Pleurotus ostreatus</i>	Antibacterial
13.	<i>Pleurotus spp.</i>	Radical scavener
14.	<i>Sparassis crispa</i>	Antitumor and hematopoietic activity
15.	<i>Sparassis crispa</i>	Antitumor and hematopoietic activity Immunomodulating activity

CONCLUSION

These remedial mushrooms can be used as useful food throughout the world. Bio-chemicals extracted from these mushrooms can be used for human wellbeing and to avoid infection. Mushroom genome is a normal source of myochemicals. Because of these reasons, we can utilize these mushrooms in host defense.

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