

Medicinal and Therapeutic agent: Mushrooms

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Abstract: Since the start of human era the nature is important source of medicines. The compound which are bioactive i.e. produced by living organisms are used to lead the new drug formulations or some bioactive compounds are directly used as drug for treatment of some disease. The plants are traditionally used as source of medicine which is evidence based. The broad medicinal use of mushroom was restricted due to its unspecified species. Some species of Mushrooms are poisonous and some are edible. Nowadays the use of Mushroom in medicinal use is increasing world wide. There are lots of scientific papers and national, international conferences are held in medicinal research.

Keywords: Mushrooms; Edible mushrooms, Psychoactive Mushrooms, Toadstool, Cardiovascular, Radical scavenging, Covid- 19

I. INTRODUCTION

A mushrooms are also called mushrooms mushrooms. Fungi are the fleshy spore forming fruiting body of fungi, that are produced above ground from nutrients such as soil and wood. These are generally toxic to humans. It additionally describes the variety of gilled fungi, with or without stem so, the time period mushroom is used to describe fleshy fruiting body of Ascomycota. The gills produce tiny spores that help the fungus spread on soil or human surfaces.

II. ETYMOLOGY

The best are mushrooms that are often described in fairy tales. In the 15th and 16th centuries, "mushroom", "mushroom", "muscheron", "moussherom", "mussheron", etc. terms have been used. The word mushroom is derived from the French word "mousseron" meaning moss. There is no distinction between edible or poisonous mushrooms or mushrooms, so mushrooms can be edible, poisonous or inedible. Medicinal mushrooms are macroscopic

fungi higher than basidiomycetes, used as extracts or as food products for the prevention, treatment or treatment of diseases.

III. MORPHOLOGY

The mycelium of the fungus lives in the substrate and produces fruit bodies when conditions are favorable. The fruit body is the first tissue formed by the underground mycelium. It turns into buttons and then grows to bear good fruit. The fruiting body of the mushroom has a stipe that supports a hat-like cap. The lower part of the umbrella consists of gills or lamellae surrounded by a membrane extending from the edge of the cap towards the center in its youthful stage . This membrane is known as Partial veil and usually tears around the margin of the pileus as the latter expands but remains attached to the stipe where it forms a ring. In some mushrooms, the small buttons are covered with a membrane called universal cover or General cover. When the lid swells , the shield ruptures and the rest of the base become volva with some cracks still attached to the lid

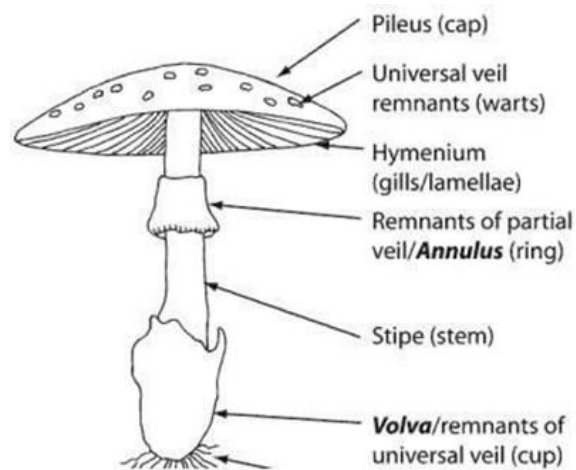


Figure 1 : Morphology Of Mushroom

1. **AGARICUS BISPORUS:** The Button Mushroom
 Hat: 3-16 cm, age convex to broadly convex or semi-flat; dry; smooth or depressed or small-scale; white in some varieties, brown in others. Gills separated from body; closed; first from pink to pinkish brown, then from dark brown to black. 2-8 cm long; 1-3 cm. thick; trustworthy; more or less equal; smooth or with small scales under the ring; white, often brown bruises; sometimes with rings that disappear with growth. The flesh is white and firm; often bruised and brown (see photo above). Tasteful and delicious food. Chemical Reaction - Lid reacts with KOH without turning yellow. Spore print brown.
 Microscopic features - spores 5.5-8.



Figure 1 : Agaricus bisporus

2. **PLEUROTUS SPP.:** The Oyster mushroom: The cap of Pleurotus ostreatus is tongue-shaped and, when grown, shell-shaped, 50-150 mm in diameter, white, gray to blue-gray. Flesh thin and white, with occasional wavy margins, repeating white gills, broad, stems extending from the centre, beginning short, disappearing with age. The large spore is white to lilac gray and the mycelium is white, fast growing, root-like to linear. Four poplar basidiocarp, heterotal, producing four haploid spores, having clamp attachment points. Some non- pathogenic bacteria species are also produced due to lack of spores.



Figure 1 : Pleurotus spp

3. **VOLVARIELLA SPP.:** The Paddy straw mushroom
 Mushrooms are white at first, darken like a curtain, and become brighter as they age. The fruit body is small when young, surrounded by a spherical shield-like shell, and when the fruit body grows, it quickly bursts, leaving the non- baglike cup at the base of the stem, called the virus. The cap is 5-15 cm wide, egg-shaped, bell-shaped or convex, with a small umbrella. Gills white, first white, then red, spores large red to pinkish brown, 7.5-9 x 4-6 μ.



IV. NUTRITION

Raw mushrooms contain 92% water, 4% carbohydrates, 2% protein and <1% fat.

CONSTITUENTS	QUANTITY	%DV
Thiamine - B1	0.1 mg	9%
Riboflavin - B2	0.5 mg	42%
Niacin - B3	3.8 mg	25%
Pantothenic Acid - B5	1.5 mg	30%
Vitamin - B6	0.11 mg	8%
Folate - B9	25 μg	6%
VitC	0	0%
VitD	3 IU	1%
Ca(Calcium)	18 mg	2%
Fe(iron)	0.4 mg	3%
Mg(magnesium)	9 mg	3%
Mn(manganese)	0.142 mg	7%
P(phosphorus)	120 mg	17%
K(potassium)	448 mg	10%
Na(sodium)	6 mg	0%
Zn(zinc)	1.1 mg	12%

Table 1 : Nutritional Value per 100 g

Energy	94 kJ (22 kcal)
Carbohydrates	4.3 g
Fat	0.1 g
Proteins	2.5g

OTHER CONSTITUENTS	QUANTITY
Selenium	26 μg
Copper	0.5 mg
Vitamin D	1276 IU

V. OTHER BENEFITS

Mushrooms are rich in B vitamins, such as:

riboflavin, or B-2

folate, or B-9

thiamine, or B-1

pantothenic acid, or B-5

niacin, or B-3

B vitamins help the body get energy from food and produce red blood cells. Many B vitamins have also been found to be important for brain health. The choline in mushrooms aids muscle, learning and memory.

Choline helps maintain the structure of cell membranes and plays a role in the transmission of nerve impulses. Mushrooms are also the only vegan, low-energy food source that contains vitamin D.

Units

mg: Milligrams ug: Micrograms

Vitamin D

The amount is dependent on after sun collection. The department of Agriculture provides evidence that fungi exposed to UV lights have high levels of vit D. Now this process is easily used in food stores and business to provide fresh vitD. Compared to natural UV, synthetic UV has a history of using nutrients to produce new vitaminD.

Mushroom

Edible mushrooms

Toxic mushrooms

Psychoactive mushrooms

Folk medicinal mushrooms

VI. OTHER USES

EDIBLE MUSHROOMS:

The edible mushrooms are extremely in cooking, as food. Nowadays Mushroom is commercially grown in mushrooms farms to sold in supermarkets for daily food supplement's most safest type of edible mushroom is *Agaricus bisporus* to eat because it is cultivated under controlled and sterilized area. The other species of edible mushroom are *Hericium erinaceus*, shiitake, maitake, pleurotus, enoki.

In last few years developing countries shows a measurable increase in mushroom cultivation, that is important for economic improvement for farmers.

Globally the country China is known as edible mushroom cultivator. It cultivated about half of all produced mushrooms i.e around 2.7 Kg of mushroom is consumed by each person each year by 1.4 billion people.

Mushroom hunting: The act of collecting mushrooms for consumptions. Mycophagy's: The people who collect mushrooms for consumptions.

TOXIC MUSHROOMS

Fungi that produces toxic, mind altering, antibiotic, biolumiscent secondary metabolites

PSYCHOACTIVE MUSHROOMS

Psychoactive mushrooms also play an important role in the arts, in some mental and physical treatments, and in promoting hearing. Psilocybin mushrooms are also known as hallucinogenic mushrooms, also known as magic mushrooms. Psychedelic mushrooms are openly sold on the market. The psychoactive mushroom, also known as *Amanita muscaria*, a minor species of the genus *Amanita*, contains the psychoactive compound muscimol. *Amanita* poisoning is similar to Z-Drugs in that they have central nervous system depression and sedative-hypnotic effects.

FOLK MEDICINE

Some of the mushrooms are used in folk medicines. The extract and powdered form are used as remedies in treatment. Some mushrooms species are hazardous but some of the species are consumed for therapeutics, some government regulatory agencies like US Food and Drug Administration regarding with dietary supplements, with government approval or prescription drugs in clinical.

OTHER USES

Dyeing wool

Some natural fibers

Fire starters : Tinder fungi

Mycorrhizae is used to developed new biological remedies technique

Use of fungi to lower bacterial levels in contaminated water

Also ongoing research in genetic engineering aimed to create enhanced qualities of mushroom of increased nutritional value.

MUSHROOMS IN CANCER TREATMENT

There is no proper evidence of mushroom or mushroom products cures cancer or prevents cancer.

But as mushrooms shows great potency in strengthen the human immune system, many developing countries are going researches in mushroom

Mushrooms shows following activity (3)

ANTIOXIDANT: Ganoderma lucidum ethanol extract has the feature of preventing peroxidation. (5)

ANTI-TUMOR: Important fungi include Grifola frondosa, Schizophyllum, Lentinus edodes and Sclerotinia, which are effective in retarding the growth of brain tumors. (5)

Antifungal

Anti-inflammatory

Anti-viral

Antibacterial

Hepatoprotective

Antidiabetic

Hyperlipidemia

Antithrombotic

Hypotensive

Immunomodulating

Radical Scavenging

Cardiovascular

Antiparasitic

Detoxification

As Antimicrobial Agents

The acetone, petroleum ether and chloroform ether extract from Osmoporus odoratus act against Streptococcus pyrogens, Pseudomonas aeruginosa, Staphylococcus aureus, Escherichia coli, Bacillus subtilis are strong antibacterial agents.(5)

As Anti-inflammatory Agents

It is known that ethanol extract of Morel mushroom and ethyl acetate and methanol extract of Ganoderma lucidum have strong anti-inflammatory properties (5).

MUSHROOM IN TREATMENT OF COVID-19

In the early days of the Covid 19 epidemic, people

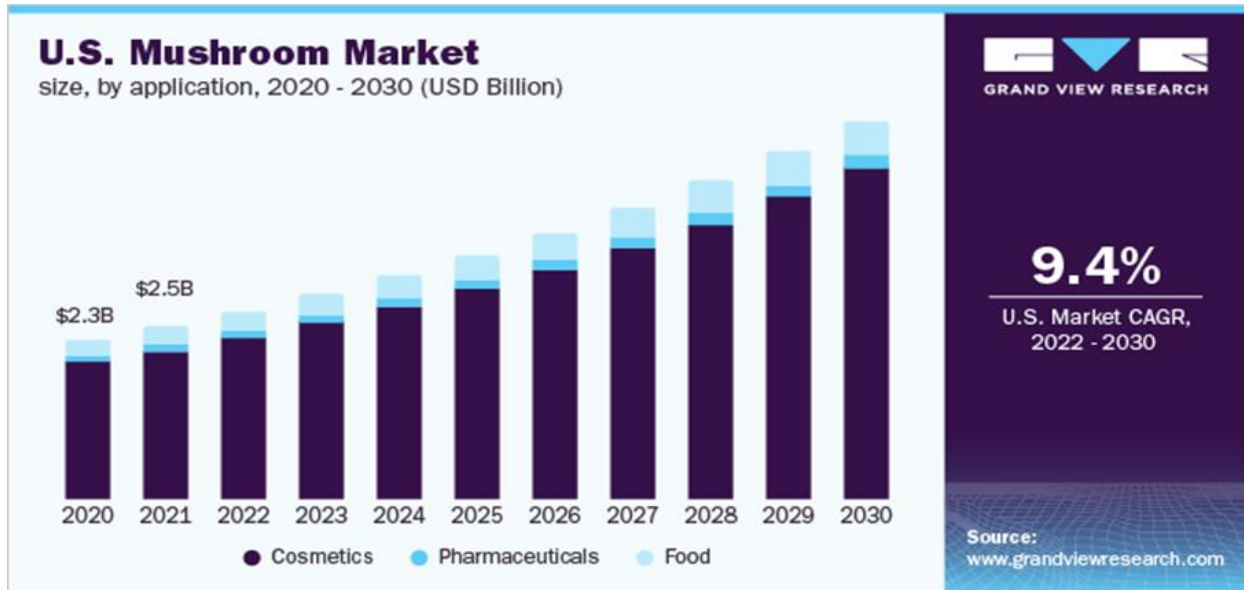
were using more and more poisons without warning. Traditional remedies such as Chinese herbs and herbal mushrooms were lacking in previous treatments. The epidemiologist, director of the Krupp Center for Integrative Research at UC San Diego, the direction of research is food and medicine. In April 2020, they applied to the US FDA for approval to run 2 randomized phase 1 trials. Double-blind, placebo-controlled studies are evaluating the safety and feasibility of using herbal mushrooms or Chinese herbal remedies to treat mild cases of COVID-19. FDA findings, the latest in the MACH-19 (Fungi and Herbal Medicines against covid 19) study, the Krupp-led and funded project is currently underway at UCLA and UC San Diego.

MEDICINAL MUSHROOM SPROUTS

In the first trial, combinations of two fungi turkey tail (Trametes versicolor) and agaricon (Fomitopsis officinalis) were studied. "It's interesting that fungi can have antibodies to SARS-CoV-2," said the principal investigator of the MACH19 study. Interactions between fungi that are part of the gut microbiome, including binding to receptors of the immune system. T cells have receptors that bind fungal polysaccharides. This is one of the ways fungi change the behavior of the immune system and become strong against SARS-CoV-2. This mushroom is used to increase immunity against cancer or chemotherapy.

VII. MUSHROOM MARKET (8)

The global mushroom market is valued at \$50.3 billion in 2021 and is expected to grow at a compound annual growth rate (CAGR) of 9.7% from 2022 to 2030. Mushrooms are rich in four essential nutrients such as selenium, vitamin D, glutathione and glutathione. ergothionine These nutrients help reduce oxidative stress and prevent or reduce the risk of chronic diseases such as cancer, heart disease and dementia.

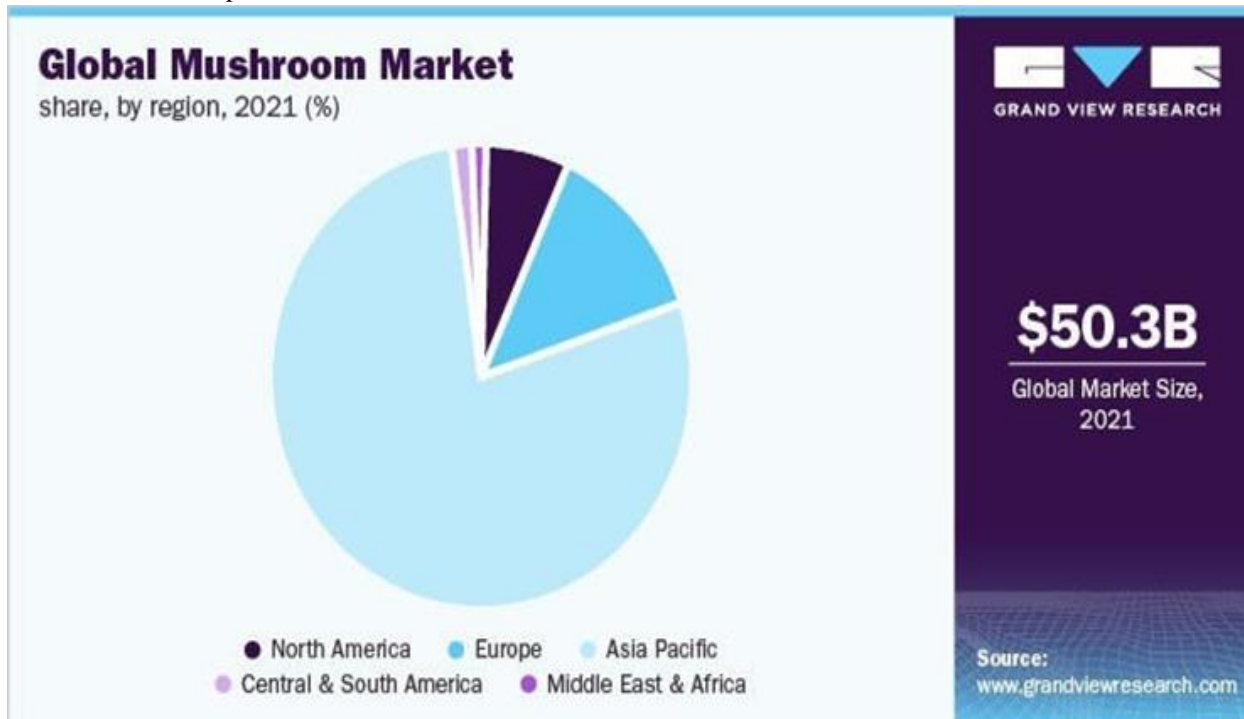


The Asia Pacific region leads the market, accounting for more than 78.6% of global revenue in 2021. China, Japan, Malaysia, India and Australia are the largest markets in the region. China has become the region's largest producer, with an annual consumption of up to 10 kg per capital

The main companies operating in the mushroom sector are:

- Bonduelle Group

- Costa Group
- CMP Mushroom
- Drinkwater Mushrooms
- Greenyard
- Greenyard Monte rey Mushroom, Inc 4 444
- Aukaishan S.A
- Shanghai Fengke Biotechnology Co., Ltd.
- Mushroom Company



VIII. MUSHROOM MARKET REPORT SCOPE

Report Attribute	Details
Market size value in 2022	USD 54.9 billion
Revenue forecast in 2030	USD 115.8 billion
Growth rate	CAGR of 9.7% from 2022 to 2030
Base year for estimation	2021
Historical data	2017 - 2020
Forecast period	2022 - 2030
Quantitative units	Volume in kilo tons, revenue in USD million, and CAGR from 2022 to 2030
Report coverage	Volume and revenue forecast, company ranking, competitive landscape, growth factors, and trends
Segments covered	Product, form, distribution channel, application, region
Regional scope	North America; Europe; Asia Pacific; Central & South America; Middle East & Africa
Country scope	U.S.; Canada; Mexico; U.K.; Germany; France; Italy; Spain; China; India; Japan; Australia; Brazil; Argentina; Saudi Arabia
Key companies profiled	Bonduelle Group; Costa Group; CMP Mushroom; Drinkwater Mushrooms; Greenyard; Monaghan Group; Monterey Mushroom, Inc.; OKECHAMP S.A; Shanghai Fengke Biological Technology Co., Ltd; The Mushroom Company
Customization scope	Free report customization (equivalent up to 8 analysts working days) with purchase. Addition or alteration to country, regional & segment scope.
Pricing and purchase options	Avail customized purchase options to meet your exact research needs.

IX. CONCLUSION

The traditional medicinal system has used foods as medicines; one such kind of traditional remedy commonly used consist of mushrooms with medicinal properties. There are several edible mushrooms that have medical significance. The medicinal mushrooms act as immunomodulatory agents to activate gut microbials. The immense medicinal and therapeutic applications of mushrooms, their potency is still underrated. In the last years, Covid-19 pandemic the mushrooms are also possesses antiviral activity are undergoes researches.

Mushrooms have long been valued as highly tasty and nutritional foods throughout world. Mushrooms are composed of polysaccharides, which are long chain molecules constructed from sugar unit.

Mushrooms are widely used for treatment of many diseases. Among these mushrooms shows antitumor, antidiabetic, anti-inflammatory, antioxidant, radical scavengers activity. The right and intelligent use of these mushrooms boost the immune system in human being

X. CONFLICTS OF INTEREST

None declared.

XI. ACKNOWLEDGMENT

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8 Mushroom Market Size, Share & Trends
Analysis Report By Product (Button, Shiitake,
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Application (Food, Pharmaceuticals, Cosmetics), By
Region, And Segment Forecasts, 2022 - 2030