Nutritional and Medicinal Value of Mushrooms

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Mushrooms are fungi, and are usually placed in a Kingdom of their own apart from plants and animals.

Mushrooms contain no chlorophyll and most are considered saprophytes. That is, they obtain their nutrition from metabolizing non living organic matter.
A mushroom (or toadstool) is a fleshy, spore bearing fruiting body of a fungus, typically produced above ground of the soil or on its food source.

The standard for the name “mushroom” is the cultivated white button mushroom (*Agaricus bisporus*); hence the word “mushroom” is most often applied to those fungi (Basidiomycota, Agaricomycetes) that have stem (Stipe), a cap (Pileus) and gills (Lamellae) on the underside of the cap. The main difference between these two groups is in the way in which they produce their microscopic spores. In the Basidiomycetes, the spores are produced externally, on the end of specialised cells called basidia. In Ascomycetes, spores are produced internally, inside a sac called an ascus.

The gills produce microscopic spores that help the fungus spread across the ground or its occupant surface.
Fig. 18. Fungi: Ascospores in ascus
Labelled Mushroom

- Cap
- Scales
- Margin (edge)
- Gills
- Ring (remnant of partial veil)
- Spores
- Universal veil
- Stem
- Volva (or sack) base or bulb
- Mycelium
**Spore-bearing surface under cap**

- **Gills:** wide and thin sheet-like plates radiating from stem
- **Pores:** many small tubes ending in a spongy surface
- **Ridges:** short, blunt elevated lines on stem and under cap
- **Teeth:** many small finger-like projections

**Gill attachment**
- **Adnate** - gills widely attached widely to stem
- **Adnexed** - gills attached narrowly to stem
- **Decurrent** - gills running down stem for some length
- **Emarginate** - gills notched immediately before attaching to stem
- **Free** - gills not attached to stem
- **Seceding** - gills attached, but breaking away from stem at margin (often older specimens)
- **Sinuate** - gills smoothly notched and running briefly down stem
- **Subdecurrent** - gills running briefly down stem

**Cap morphology**
- **Campanulate** - bell-shaped
- **Conical** - triangular
- **Convex** - outwardly rounded
- **Depressed** - with a low central region
- **Flat** - with top of uniform height
- **Infundibuliform** - deeply depressed, funnel-shaped
- **Ovate** - shaped like half an egg
- **Umbilicate** - with a small, deep depression
- **Umbonate** - with a central bump or knob
Mushrooms in India

- White button mushroom (*Agaricus bisporus*)
- Oyster mushroom (*Pleurotus* spp.)
- Milky mushroom (*Calocybe indica*)
- Paddy straw mushroom (*Volvariella volvacea*)
- Shiitake (*Lentinula edodes*)
Nutritional value of Mushroom

Nutritional Value of Mushrooms

Fiber
Inhibit Histamine Release
Phosphorous
Potassium
Tasty
Low Fat
Magnesium
Anti-inflammatory
Cancer Fighting
Copper
Polysaccharides
Stimulate the Immune System
Zinc
B Vitamins
Few Calories
Triterpenes
Selenium
Vitamin D
Protein
No Cholesterol

www.mushroom-appreciation.com
HEALTH BENEFITS OF MUSHROOM

- Helps lower cholesterol levels
- Prevents breast & prostate cancer
- Helps lose weight
- Improves bone health
- Stimulates absorption of iron
- Reduces blood pressure
- Boosts immune system
- Protectors diabetics from infections

Nutrients*
- Protein 6%
- Dietary Fiber 4%
- Carbohydrate 1%
- Calories 1%

Vitamins*
- Riboflavin 24%
- Niacin 18%
- Pantothenic Acid 15%
- Vitamin D 5%

Minerals*
- Copper 16%
- Selenium 13%
- Phosphorus 9%
- Potassium 9%

Caution: Do not consume poisonous mushroom

*% Daily Value per 100g. For e.g. 100g of Mushroom provides 24% of daily requirement of Riboflavin

Mushrooms are relatively high in protein, averaging about 30-35% of their dried mass.

They contribute a wide range of essential amino acids, are low in fat (0.3 - 2.0%), high in fibre and provide several groups of vitamins, particularly thiamine, riboflavin, niacin, biotin and ascorbic acid.

While nutrients vary from one kind of mushroom to the next, many contain protein, vitamins A and C, B-vitamins and minerals including iron, selenium, potassium and phosphorus.
Complete & Quality Food

- Carbohydrate
- Protein
- Fat
- Minerals
- Vitamins
- Growth Promoting substances
Carbohydrates

- No starch
- Less sugars
- Fibre: Dietary & Fermentable
- Low calorific value

Delight of diabetics
Avoids constipation
Prevents Obesity
• Prominent source (FAO)
• Varies from 4-12 %
• High biological value
• Rich in Threonine and Valine
• Good for Infants, children, pregnant and lactating women
• Deficient in sulphur containing AA (Methionine & Cysteine)

Fights malnutrition Kwashiorkor disease
SYMPTOMS OF KWASHIORKOR

- Producing belly
- Brownish hair
- Dark and scaly skin
- Stunted growth
- Underweight
- Swollen legs
- Loss of appetite
- Anaemia
- Mental retardation
- Reduced resistance
Fat

• Little fat (< 1 to 8%)

• High un-saturated fatty acids

• Absence of cholesterol

• Sterols : Ergosterol

Good for hearts

Precursor for Vit. D
Vitamins

- **B Complex**
  - Thiamine : $B_1$
  - Riboflavin : $B_2$
  - Niacin
  - Biotin

- Poor in A, E and K
- Exposed to UV light : Vitamin $D_2$
- Traces of Folic acid and vitamin $B_{12}$

Beri beri
Skin crack, smooth tongue, Pellagra
Dermatitis & Hair loss
- **Ash content**: High (up to 9%)
- **Potassium**: 45% of ash
- **P, Na & Ca**
- **Enough selenium** Augments immune system
- **Iron, Copper**
- **K: Na ratio**: High (110:1) Improves blood circulation
Growth Promoting Substances

- **Enzymes**: Aromatase (Produce estrogen)
- **Alkaloids**: Cordycepin, Lectins, Lovastatin (For various body functions)
- **Sterols**: Ergosterol (Ergosterol performs the same function as cholesterol in animal membranes, namely, modulating membrane fluidity and permeability through its interactions with phospholipids and other membrane constituents)
- **Antioxidants**: Ascorbic acid, Tri-terpenoids
- **Unidentified**: Complex organic compounds
Composition of Mushrooms

- Mushrooms have little sodium, fat and zero cholesterol.
- They are rich in vitamins mainly B complex (riboflavin, niacin, folate, pantothenic acid, thiamine and B₆). It is also rich source of vitamin D.
- Antioxidants in mushrooms include ergothioneine (Protection against cardiovascular diseases, chronic inflammatory conditions, ultraviolet radiation damages, and neuronal injuries).
- Mushrooms are a powerhouse of minerals, including potassium, copper, zinc, selenium, iron, magnesium, phosphorus and calcium.
A medium mushroom has more potassium than a glass of orange juice or a banana. A serving (100 g) of mushrooms supplies 40-60% of the daily copper requirement.

Selenium is mainly found in animal proteins, so the mushroom is the best source of selenium for vegetarians.

Selenium is an extremely vital mineral for the human body as it increases immunity, takes part in antioxidant activity that defends against free radical damage and inflammation and plays a key role in maintaining a healthy metabolism.

The source of the antibiotic penicillin, mushrooms have natural antibiotics with anti-fungal and anti-microbial properties.
Health Benefits of Mushrooms

- Vitamins, minerals and antioxidants in mushrooms contribute to their preventive and curative properties and health benefits.
- Potassium helps to lower blood pressure and prevent strokes.
- Copper prevents cardiac problems, while zinc ensures proper metabolic functioning.
- Calcium strengthens bones and iron prevents anaemia.
Selenium, in combination with beta glucans and linoleic acid in mushrooms, prevents cancer and cell damage due to free radicals. It is also beneficial for the teeth, nails, bones and hair.

Antioxidants boost immunity and prevent infections. Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged.

The combination of protein, fibre and vitamin B helps to maintain a healthy metabolism.
Sources of free radicals

- Smoking
- Pollution
- Drugs
- Toxic metals
- Radiation
- Industrial chemicals
- Pesticides
- Alcohol
Unpaired Electron

Electron Donation

Antioxidant

Free Radical
Ganoderma lucidum (Lingzhi or Reishi)

- Among cultivated mushrooms, *G. lucidum* is unique in that its pharmaceutical rather than nutritional value is paramount.
- A variety of commercial *G. lucidum* products are available in various forms, such as powders, dietary supplements, and tea.
- *Ganoderma lucidum* has many medicinal properties like anti-oxidative, anti-cancer, anti-tumor, anti-microbial, anti-fungal, anti-viral, Anti-inflammatory etc.
- Reishi mushroom improve oxygen utilization, boosting the immune system, improve liver functions, improve blood circulation, immunological diseases, hypertension, tumor-ogenesis, regulates and fine tunes the immune system.
Cordyceps sinensis (Kidajadi)

- *Cordyceps sinensis* is recommended for “all illnesses” as a tonic, because it is claimed that it improves energy, appetite, stamina, libido, endurance, and sleeping patterns.

- It is a rare combination of a caterpillar and fungus found in Sikkim, Uttarakhand and H.P. at altitudes above 3,800 m.
Evidence showed that the active principles of *C. militaris* are beneficial to act as anti-inflammatory, anti-oxidant/anti-aging, anti-tumour/anti-cancer/anti-leukemic, anti-proliferative, anti-metastatic, immunomodulatory, anti-microbial, anti-bacterial, anti-viral, anti-fungal, anti-protozoal, insecticidal, larvicidal, anti-fibrotic, steroidogenic, hypoglacaemic, hypolipidaemic, anti-angiogenetic, anti-diabetic, anti-HIV, anti-malarial, anti-fatigue, neuroprotective, liver-protective, reno-protective as well as pneumo-protective
खुम्ब इसीलिए महान, बनाए रखे सदा जवान।
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