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Mushrooms as Medicine: Ancient Wisdom Meets Modern Science

*A. Arundathi
Department of Plant Biotechnology, CPMB and B, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu, India
*Corresponding Author's email: arundathi32002@gmail.com

Across centuries, mushrooms have been valued as both food and natural medicine. Ancient cultures used them to restore strength, protect against illness, and promote longevity. Today scientific research is validating much of this traditional wisdom, revealing bioactive compounds in mushrooms that enhance immunity, combat cancer and offer other health benefits. Mushrooms are emerging as a bridge between ancient healing tradition and modern medical science. This article explores the medicinal significance of mushroom, tracing their importance from ancient civilization to modern scientific research.

Keyword: Mushroom

Introduction

Mushrooms are macro fungi, belonging to the Basidiomycota division, which comprises spore-bearing fleshy fruiting bodies (Miles and Chang, 1997). Globally, mushroom production has been increased more than fivefold since 2000, reaching 44 million tonnes in 2023. Asia is the dominant producer, contributing 95 % of total production , followed by Europe (3%), and America (1%). China dominates the market, accounting for 93 % of fresh mushroom output (FAOSTAT, 2023). Mushrooms are easy to cultivate, need less space and offer a variety of medicinal benefits (Singh and Singh, 2014). Mushrooms are nutrient-dense, low fat, and rich in proteins, fibre, carbohydrates, vitamins, minerals offering medicinal properties such as antiviral, antibacterial, immunomodulatory, anticancer, and cholesterol lowering properties (Chaturvedi *et al.*, 2018). Since the Neolithic era, mushrooms are prominently utilized in traditional therapies and healing practices. From ancient times to the present, mushroom have been prized for both their nutritional value and medicinal properties (Chang and Wasser, 2012).

History of therapeutical roles of mushroom

Across diverse cultures, mushrooms have been valued as therapeutical values for thousands of years.

Historical timeline of mushroom medicinal properties (Stamets and Zwickey, 2014; Quadir, 2021):

- 3300 BCE - Ötzi the Tyrolean Iceman

Fomes fomentarius and *Piptoporous betulius* utilized for antimicrobial, antiparasitic, wound-healing.

- 2800 BCE – Sheng-Nong

  Documented the medicinal mushrooms for vitality, longevity, and disease prevention

- 450 BCE – Hippocrates (Greece)

Identified *Fomes fomentarius* as an anti-inflammatory and for wound cauterization.

- Tao Hongjing (456-536 CE)

Recorded *Ganoderma lucidum* and *Dendropolyporus umbellatus* for their medicinal healing, and tonic properties.

Medicinal value of mushroom in modern healthcare

Mushroom have gained prominence in modern healthcare for their bioactive compounds with therapeutical potential (Fig. 1).

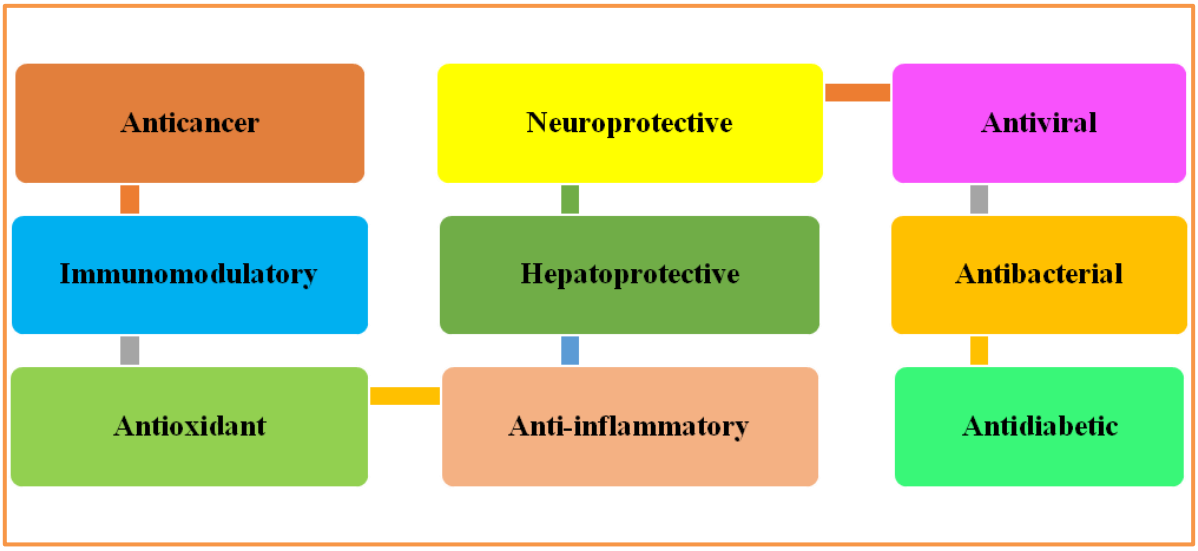

Figure 1. Comprehensive overview of various medicinal properties exhibited by diverse mushroom

a) *Ganoderma lucidum* (Reishi mushroom)

Reishi, highly regarded mushroom in traditional Chinese medicinal practices. *G. lucidum* is used to treat allergies, insomnia, inflammation, cancer, nephritis, and neurasthenia. The antitumor activity of *G. lucidum* is mainly attributed to its branched (1→3)-β-D-glucans (Sliva, 2003). Bioactive compounds such as lectins, polysaccharides, and terpenes mainly act on bacterial cytoplasmic membrane which contributed towards antimicrobial activity against *Escherichia coli*, *Bacillus* species, and *Salmonella* species (Quereshi *et al.*, 2010).

b) *Lentinus edodes* (Shiitake mushroom)

Lentinus edodes is known as oriental folk medicine, which contains major bioactive compounds such as lentinan, eritadenine, and oxalic acid. Shiitake derived eritadenine (lentinacin or lentyysine) reduces serum cholesterol by enhancing its excretion and breakdown rather than blocking the synthesis (Hobbs, 2000). Lentinan, a β-glucan from *L. edodes* shows strong antitumor and immunomodulatory effect via oral administration achieving 94.44% tumor inhibition rate in mice (Yap and Ng, 2005). Lentinan and oxalic acid are the major compounds present in *L. edodes*, which exhibited a strong antiviral and antibacterial activity against Adenovirus type 2, Abelson virus, *Bacillus megaterium*, and *Staphylococcus aureus* (Poucheret *et al.*, 2006).

c) *Inonotous oliquus* (Chaga mushroom)

Chaga mushroom utilized as folk medicine in Siberia, and Russia which have the ability to treat major disease such as cancer, diabetes, liver disorders and cardiovascular diseases (Ahmed *et al.*, 2023). *I. oliquus* contains bioactive compounds like polysaccharides, triterpenoids, and polyphenols that provide anti-inflammatory, anticancer, antioxidant, and antimicrobial effects. The extract of *I. oliquus* displayed strong hepatoprotective effects, which help in preventing liver injury, reduce fat accumulation in liver, and protect against hepatic fibrosis (Ishfaq *et al.*, 2022).

d) *Hericium erinaceus* (Loin's mane mushroom)

H. erinaceus , an edible mushroom used in traditional Asian medicine, is gaining attentions for its neuroprotective and theraputical potential. Compounds like erinacines, hercerins, hericenones, steroids, and terpenes derived from *H. erinaceus*, promotes nerve regeneration, enhance cognitive health, improvements in anxiety, depression, anticarcinogenic, cardioprotective, immunostimulatory, and hepatoprotective effects (Friedman, 2015; Thongbai *et al.*, 2015).

e) *Pleurotus ostreatus* (Oyster mushroom)

Oyster mushroom is one the most common dietary and health promoting mushroom. *P. ostreatus* valued for its medicinal and pharmacological properties, including antioxidant, anti-inflammatory, antidiabetic, and hepatoprotective effects (Lesa *et al.*, 2022). *P. ostreatus* are utilized in dietary supplements to boost immunity, cosmetics, functional foods as probiotics, and as natural preservative (Golak-Siwulska *et al.*, 2018).

Future perspective in mushroom-based therapies

- Clinical validation and standardization - Comprehensive clinical studies to verify therapeutic benefits and establish standardized dosage.
- Biotechnological advancements - Advanced cultivation practices and extraction techniques to increase yield and potency of bioactive mushroom compounds.
- Integration with conventional medicines.
- Personalized medicine - Use of pharmacogenomics to customized mushroom-based treatments for individual patients.
- Regulatory guidelines - Development of framework for quality, safety, and efficacy of mushroom-derived products in clinical practices.

Conclusion

Mushrooms represent a valuable source of bioactive compounds with significant health benefits. By integrating traditional knowledge with modern scientific approaches, the use of mushroom can be optimized for disease prevention, and treatment.

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