



AGRI MAGAZINE

(International E-Magazine for Agricultural Articles)

Volume: 03, Issue: 06 (June, 2026)

Available online at <http://www.agrimagazine.in>

© Agri Magazine, ISSN: 3048-8656

Medicinal Properties of Edible Mushrooms: A Review of Bioactive Compounds and Therapeutic Potential

*Nandhini D C and Dr. K. Vignesh

Palar Agricultural College, Melpatti, Vellore, Tamil Nadu, India

*Corresponding Author's email: nandhinidc21@gmail.com

Edible mushrooms occupy a distinctive position at the intersection of nutrition and pharmacology, serving simultaneously as dietary staples and sources of bioactive compounds with clinically relevant therapeutic properties. This review examines the principal medicinal attributes of widely consumed species—including *Agaricus bisporus* (Button Mushroom), *Pleurotus ostreatus* (Oyster Mushroom), and *Lentinula edodes* (Shiitake Mushroom)—with particular emphasis on their antioxidant, immunomodulatory, anticancer, antidiabetic, cardioprotective, antimicrobial, and anti-inflammatory activities. The pharmacological efficacy of these fungi is attributable to a diverse array of bioactive constituents, notably polysaccharides, β -glucans, phenolic compounds, terpenoids, and lectins. Contemporary research increasingly supports the classification of edible mushrooms as functional foods, and their expanding role in nutraceutical and pharmaceutical development is examined within the broader context of sustainable health promotion.

Introduction

Edible mushrooms have been integral to culinary and medicinal traditions across diverse cultures for millennia, with particularly extensive documentation in East Asian systems of traditional medicine. Contemporary biomedical research has progressively validated these historical applications, demonstrating that mushrooms harbour a rich repertoire of pharmacologically active compounds capable of modulating key physiological processes. Beyond their established nutritional value—encompassing high-quality proteins, essential vitamins, and dietary minerals—mushrooms are now recognised as functional foods, a designation reflecting their capacity to confer health benefits beyond basic nutritional requirements (Cheung, 2008; Chang & Miles, 2004). The global interest in mushroom-derived therapeutics has intensified in response to the growing burden of chronic non-communicable diseases and the escalating demand for natural, plant-based health interventions. Increasingly, researchers and clinicians are investigating whether bioactive compounds isolated from edible fungi may serve as adjunctive or primary agents in the prevention and management of conditions such as cancer, type 2 diabetes mellitus, cardiovascular disease, and immunological disorders. This review synthesises current evidence on the medicinal value of select edible mushroom species, with reference to their primary bioactive constituents and associated pharmacological mechanisms.



Nutritional Composition and Bioactive Constituents

Edible mushrooms present a favourable macronutrient profile, characterised by moderate to high protein content, low fat, and substantial dietary fibre, rendering them nutritionally valuable for a wide range of dietary contexts. They are notable sources of several micronutrients critical to human health, including:

- B-complex vitamins (B1/thiamine, B2/riboflavin, B12/cobalamin)
- Vitamin D (particularly following UV light exposure)
- Essential minerals: potassium, selenium, iron, and zinc
- All essential amino acids in varying proportions

Of particular pharmacological significance, however, are the secondary metabolites and structural polysaccharides present in mushroom fruiting bodies and mycelium. These bioactive compounds include β -glucans, α -glucans, heteropolysaccharides, phenolic acids, flavonoids, terpenoids (including triterpenoids and diterpenes), lectins, ergothioneine, and ergosterol (a precursor to vitamin D2). Each class of compounds is associated with distinct biological activities, and their combined presence is thought to contribute to the characteristic broad-spectrum medicinal effects observed in edible fungal species (Heleno et al., 2012; Wasser, 2010).

Medicinal Properties of Edible Mushrooms

Antioxidant Activity

Oxidative stress, arising from an imbalance between reactive oxygen species (ROS) generation and antioxidant defence mechanisms, is implicated in the pathogenesis of numerous chronic conditions, including atherosclerosis, neurodegeneration, diabetes mellitus, and malignancies. Edible mushrooms contain a broad spectrum of antioxidant agents—including phenols, flavonoids, the amino acid-derived thiol ergothioneine, and the trace element selenium—that collectively attenuate free radical activity and mitigate oxidative damage at the cellular level. Among commonly consumed species, *Pleurotus ostreatus* (Oyster Mushroom) has been the subject of considerable investigation owing to its particularly high phenolic content, which correlates with robust in vitro and in vivo antioxidant capacity. The antioxidant activity of mushroom extracts has been demonstrated through multiple standard assays, including DPPH radical scavenging, FRAP (ferric reducing antioxidant power), and ABTS methods, confirming their potential utility as dietary sources of natural antioxidants (Heleno et al., 2012).

Immunomodulatory Effects

Among the most thoroughly studied pharmacological properties of edible mushrooms is their capacity to modulate immune function. This activity is principally attributed to β -(1 \rightarrow 3) and β -(1 \rightarrow 6)-glucans, high-molecular-weight polysaccharides that interact with pattern recognition receptors—including dectin-1, complement receptor 3, and toll-like receptors—on the surface of innate immune cells. This interaction triggers downstream signalling cascades that promote the activation and proliferation of macrophages, natural killer (NK) cells, dendritic cells, and T-lymphocytes, thereby enhancing both innate and adaptive immune responses. *Lentinula edodes* (Shiitake Mushroom) is particularly valued in this context for its production of lentinan, a purified β -1,3-glucan with a branched β -1,6 side chain, which has been investigated as an adjuvant in oncological treatment protocols in Japan. Clinical studies have reported that lentinan administration, in conjunction with standard chemotherapy, may improve immunological parameters and quality-of-life outcomes in certain cancer patients, underscoring the translational relevance of mushroom-derived immunomodulators (Wasser, 2010).

Anticancer Properties

A substantial body of preclinical evidence supports the anticancer potential of bioactive compounds derived from edible mushrooms. The mechanisms by which mushroom constituents exert antineoplastic effects are multifaceted and include: inhibition of tumour cell proliferation, induction of apoptosis (programmed cell death) via caspase-dependent and

independent pathways, suppression of angiogenesis, and downregulation of oncogenic signalling pathways such as NF- κ B and MAPK. *Agaricus bisporus* (Button Mushroom) has attracted particular interest in the context of hormone-sensitive cancers. In vitro and animal studies have demonstrated that conjugated linoleic acid and other phytochemicals present in this species may inhibit aromatase activity—an enzyme responsible for oestrogen biosynthesis—thereby potentially reducing the risk of oestrogen-receptor-positive breast cancer.

Antidiabetic Effects

The antidiabetic properties of edible mushrooms represent a growing area of investigation, particularly given the global prevalence of type 2 diabetes mellitus and the associated demand for complementary dietary interventions. Mushrooms are characterised by a low glycaemic index and significant dietary fibre content, which collectively attenuate postprandial glucose absorption and reduce insulin secretory demands. Beyond these mechanical effects, specific mushroom polysaccharides have been demonstrated to enhance insulin sensitivity, upregulate glucose transporter (GLUT4) expression, and improve hepatic glucose metabolism. *P. ostreatus* has been among the most extensively studied species in this regard. Clinical and animal model investigations have reported significant reductions in fasting blood glucose concentrations and serum total cholesterol following regular consumption of Oyster Mushroom extracts, with effects mediated in part through PPAR- γ activation and α -glucosidase inhibition. These findings position edible mushrooms as potentially valuable adjunctive dietary components in the comprehensive management of metabolic syndrome and type 2 diabetes (FAO, 2004).

Cardiovascular Benefits

The cardiovascular protective effects of edible mushrooms are supported by multiple lines of biochemical and epidemiological evidence. From a compositional standpoint, mushrooms are inherently low in sodium and saturated fats while providing meaningful quantities of potassium and soluble dietary fibre—a nutritional profile conducive to blood pressure regulation and lipid homeostasis. Potassium counteracts the hypertensive effects of sodium through renal and vascular mechanisms, while soluble β -glucan fibre reduces cholesterol absorption in the small intestine through bile acid sequestration. Additionally, several mushroom species elaborate secondary metabolites with direct lipid-lowering activity. Lovastatin, a polyketide natural product originally isolated from fungal sources and now widely used pharmaceutically, has been identified in *Pleurotus* species. As an HMG-CoA reductase inhibitor, lovastatin reduces hepatic cholesterol synthesis and consequently lowers circulating low-density lipoprotein (LDL) concentrations, thereby attenuating a principal modifiable risk factor for ischaemic heart disease (Wasser, 2010).

Pharmaceutical and Economic Significance

The well-characterised pharmacological properties of edible mushrooms have translated into considerable and growing commercial interest across the nutraceutical, functional food, and pharmaceutical sectors. Mushroom-derived bioactive compounds—particularly polysaccharide-protein complexes and β -glucan fractions—are currently incorporated into a diverse portfolio of commercial health products, including:

- Standardised dietary supplements and capsule formulations
- Functional food ingredients and fortified food products
- Herbal and integrative medicine preparations
- Adjunctive immune-supportive formulations for oncology patients

The global market for medicinal mushroom products has expanded considerably in recent decades, driven by increasing consumer awareness of preventive health strategies and the growing integration of evidence-based complementary medicine into mainstream healthcare frameworks. Moreover, commercial mushroom cultivation offers socioeconomic benefits, providing viable livelihood opportunities in rural agricultural communities and supporting sustainable food systems through the efficient utilisation of agricultural lignocellulosic waste substrates (FAO, 2004; Chang & Miles, 2004).

Conclusion

The preponderance of contemporary evidence substantiates the traditional valorisation of edible mushrooms as both nutritional and therapeutic agents. Their diverse array of pharmacologically active compounds—encompassing polysaccharides, β -glucans, phenolics, terpenoids, and lectins—underpins a broad range of clinically relevant biological activities, including antioxidant, immunomodulatory, anticancer, antidiabetic, cardioprotective, antimicrobial, and anti-inflammatory effects. These properties collectively position edible mushrooms as scientifically credible functional foods with meaningful implications for disease prevention and health promotion.

References

1. Chang, S. T., & Miles, P. G. (2004). *Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact*. CRC Press.
2. Cheung, P. C. K. (2008). *Mushrooms as Functional Foods*. Wiley.
3. Food and Agriculture Organization. (2004). *Wild edible fungi: A global overview of their use and importance to people*. FAO.
4. Vignesh K. Green synthesis and characterization of zinc oxide nanoparticles using neem (*Azadirachta indica* L.) leaf extract. *Asian J Plant Pathol* 2025; 19(1): 27–35. <https://doi.org/10.1016/j.mtcomm.2023.105942>
5. Heleno, S. A., Barros, L., & Ferreira, I. C. F. R. (2012). Chemical composition, antioxidant activity, and bioactive compounds of mushrooms. *Food Chemistry*, 135(2), 635–645.
6. Patel, S., & Goyal, A. (2012). Recent developments in mushrooms as anti-cancer therapeutics: A review. *3 Biotech*, 2(1), 1–15.
7. Vignesh K. Survey on the incidence of Fusarium wilt of tomato incited by *Fusarium oxysporum* f. sp. *lycopersici* (Fol) in major tomato growing areas of krishnagiri district. *Plant Archives*. 2021;21:2369-2376
8. Harini M, Reddy PSK, Vignesh K, Hari K, Reddy PSS. Unlocking the genetic diversity of bush hyacinth bean (*Lablab purpureus* var. *typicus* L.) landraces under South Indian agro-ecologies. *Genet Resour Crop Evol*. 2025;72:1-24.
9. K. Vignesh, L. Vengadeskumar, S. Sanjaygandhi, T. Sabesan, Prevalence of maydis leaf blight of maize in Tamil Nadu and assess the morphological character and virulence of *Bipolaris maydis* (NISIK.) shoemaker, *The Pharma Innovation Journal*, 12, 6, 65-70 (2023)
10. Wasser, S. P. (2010). Medicinal mushroom science: Current perspectives, advances, evidences, and challenges. *Biomedical Journal*, 2(4), 345–356.
11. Vignesh, K.; Rajamohan, K.; Anandan, P.; Udhayakumar, R. Morphological and molecular variation of *Fusarium oxysporum* f. sp. *lycopersici* isolates causing wilt in tomato. *Plant Arch*. 2021, 21, 2363–2368.