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Exploring the Pharmacological Potential of Button Mushrooms: A Comprehensive Review

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Abstract: ***Mushrooms are a sort of miniature growths that are usually developed and consumed in different nations all over the planet.***
Despite their ubiquity, many individuals don't know about their critical significance. Mushrooms offer different pharmacological properties, like an enemy of malignant growth, against bacteria, hostile to oxidative, hostile to viral, against diabetes, and hostile to unfavorably susceptible specialists.
They are currently generally utilized in various nations for the therapy of malignant growth, diabetes, hypertension, aggravation, and numerous different sicknesses. Mushrooms are likewise eaten overall given their critical health benefit. They contain vitamin B, zinc, selenium, protein, pantothenic corrosive, copper, potassium, glycerol, mannitol, ß-glucans, phosphorus, polysaccharides, and magnesium.
They satisfy an enormous mineral and nourishing need of our body. This review has aggregated data on the pharmacological and healthful advantages of Button mushrooms and reasoned that dietary supplementation of mushrooms could give tremendous expected in the avoidance and treatment of different illnesses.
Keywords: Mushrooms, Pharmacological, Wholesome, Cell reinforcement, Disease, Nutrient.

I. INTRODUCTION

Mushrooms have been a piece of the human eating routine for millennia. They likewise have been utilized often in homeopathic medication. Mushroom utilization has been notably expanding all through the world and includes various species. Different eatable mushrooms are consumed for pleasure as well as their medical advantages, for example, containing somewhat couple of calories and moderately high measures of vegetable proteins.

Their fruiting bodies, on a dry weight premise, contain around 39.9%carbohydrate, 17.5% protein, and 2.9% fats, with the rest comprising of minerals.

Developed mushrooms are a decent wellspring of Vitamin B2, niacin, and folates. Agaricus bisporus is typically called a normal mushroom, button mushroom, white mushroom, table mushroom, portobello mushroom, cremini, crimini mushroom, Swiss earthy colored mushroom, Roman earthy colored mushroom, Italian brown, Italian mushroom, or developed mushroom. White button mushrooms (Agaricus bisporus), an individual from the Basidiomycetes family has acquired prevalence as a quality feast because of its wealth of supplements, including proteins, carbs, lipids, fiber, minerals, furthermore, vitamins having positive benefits on metabolic turmoil, immunological capability, stomach wellbeing, and disease, with most proof prompting an expansion in degrees of vitamin D in individuals (Jegathchandran et al., 2024).

It is a consumable basidiomycete mushroom local to prairies in India, Europe, and North America. White button mushrooms (Agaricus bisporus) (WBM) comprise 91% of the absolute mushrooms consumed in the US, it is one of the most broadly developed mushrooms on the planet. The first wild structure bore a tarnished cap and dull-colored gills however more recognizable is the ongoing variation with a white cap, tail, and tissue and earthy-colored gills (Sadler, 2003).

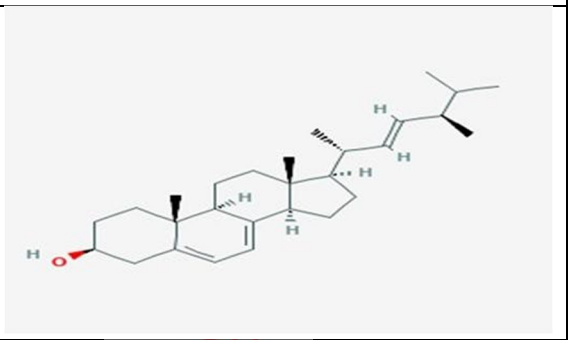
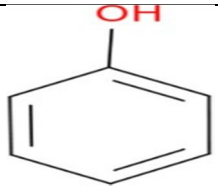
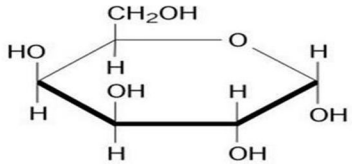
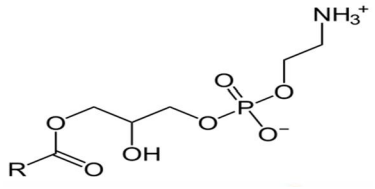
II. CHEMICAL CONSTITUENTS OF MUSHROOMS

The straightforward piece (dampness, by and large sugars, dietary fiber, unrefined fat, debris, nitrogen, and protein) and amino corrosive items still up in the air in the developed mushrooms in a few trials. Predominantly amino acids, unsaturated fats, sterol (for the most part ergosterol), linoleic corrosive, and palmitic still up in the air to be available in mushrooms (Iqbal et al., 2024). Chemical constituents of button mushrooms are discussed in table 1.1

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Table 1.1: Chemical constituents of Button mushrooms:

Name of the chemicalconstituents in White Button Mushroom.	Structure
1. Ergosterol	
2. Phenol	
3. Carbohydrate	
4. Lipid	

III. NUTRITIONAL VALUE OF BUTTON MUSHROOMS

Nutritional values of Button mushrooms are discussed in table 1.2

Table 1.2: Nutritional value of Button Mushrooms

Energy	96 kJ (23.02 kcal)
Carbohydrates	3.29 g
Sugars	1.67 g
Fat	0.33 g
Protein	3.10 g
Vitamin C	2.2 mg (5%)
Iron	0.50 mg (3%)
Riboflavin (Vit. B2)	0.404 mg (28%)

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IV. PHARMACOLOGICAL PROPERTIES OF BUTTON MUSHROOMS

Restorative worth Agaricus bisporus is a decent wellspring of minor components like sodium, potassium, and phosphorus, conjugated linoleic corrosive, and cell reinforcements. It can restrain aromatase and hence might have the option to bring down the estrogen levels in the human body, which could diminish bosom malignant growth weakness. Agaricus bisoporous posseses various Pharmamacolical activities Like anticancer, hypolipidaemic, cardiovascular and many more. These activities are shown in figure 1.1.

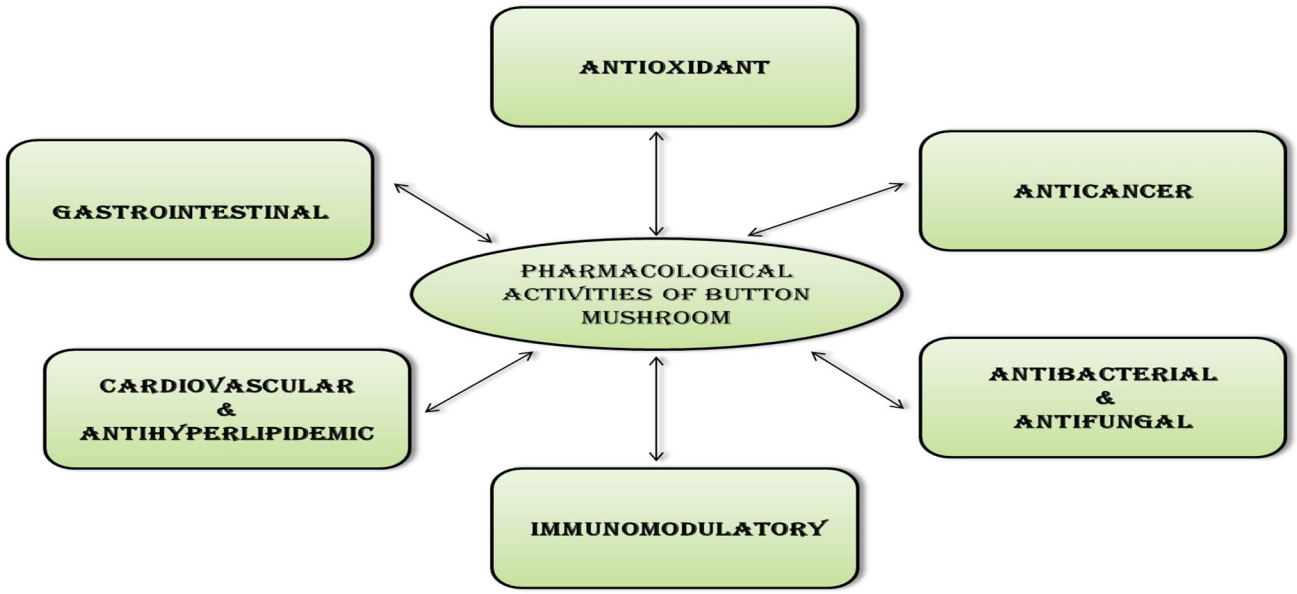


Figure 1.1: Pharmacological properties of Button mushrooms

A. Anticancer Properties

Agaricus bisporus incorporates three usually consumed mushrooms: white button, earthy-colored button, and portabella mushrooms. In the US, A. bisporus is the prevailing consumable mushroom and records for more than 90% deals of the market. Contrasted with other consumable mushrooms, A. bisporus has been less all around explored less for its anticancer action. No examinations have been distributed on the anticancer movement of portabella, and just a single distribution revealed the anticancer action of a temp water concentrate of earthy-colored button mushrooms against MCF-7 bosom disease cells. Oral organization of white button mushroom powder (three dimensional/week, 4.8 g/d for females and 4.2 g/d for guys) in a similar model brought about expansions in cancers of the front stomach, glandular stomach, duodenum, and ovaries contrasted with control mice. The dosages utilized in these two examinations were equivalent: 2 - 3 mg agaritine/mouse for subcutaneous infusion and 1.7 - 3.4 mg/mouse for oral organization. The contrasting outcomes from subcutaneous and oral investigations could be because of the digestion of agaritine. In vitro, the mutagenicity of agaritine was expanded within the sight of tyrosinase and rodent hepatic cytosol. In rodents, 8 agaritine loses a glutamyl moiety by γ-glutamyl transpeptidase, and afterward, the free hydrazine might be oxidized into benzene diazonium particle, which is a mutagen in the Ames test 3

The cell reinforcement exercises of ethanolic separate from consumable mushroom Agaricus bisporus (A. bisporus) were assessed by different techniques in vitro and in vivo. In cell reinforcement tests in vitro, ethanolic concentrate of A. bisporus was found to areas of strength for have power, superoxide extremist, hydroxyl revolutionary and 2,2-diphenyl-1-picrylhydrazyl revolutionary rummaging action, and moderate hydrogen peroxide searching movement. In cell reinforcement measures in vivo, mice were regulated with ethanolic concentrate of A. bisporus through gavage for 30 back-to-back days. Accordingly, the organization of ethanolic extricate fundamentally improved the exercises of cell reinforcement compounds in serums, livers, and hearts of mice. Furthermore, the all-out phenolic content still up in the air by the Folin-Ciocalteu technique was 6.18mg of gallic corrosive counterparts per gram of dry weight. The primary phenolic compounds in ethanolic extricate dissected by super elite execution fluid chromatography coupled mass still up in the air as gallic corrosive, protocatechuic corrosive, catechin, caffeic corrosive, ferulic corrosive, and myricetin. These outcomes proposed that the ethanolic concentrate of A. bisporus had powerful cell reinforcement movement and could be investigated as an original regular cell reinforcement.

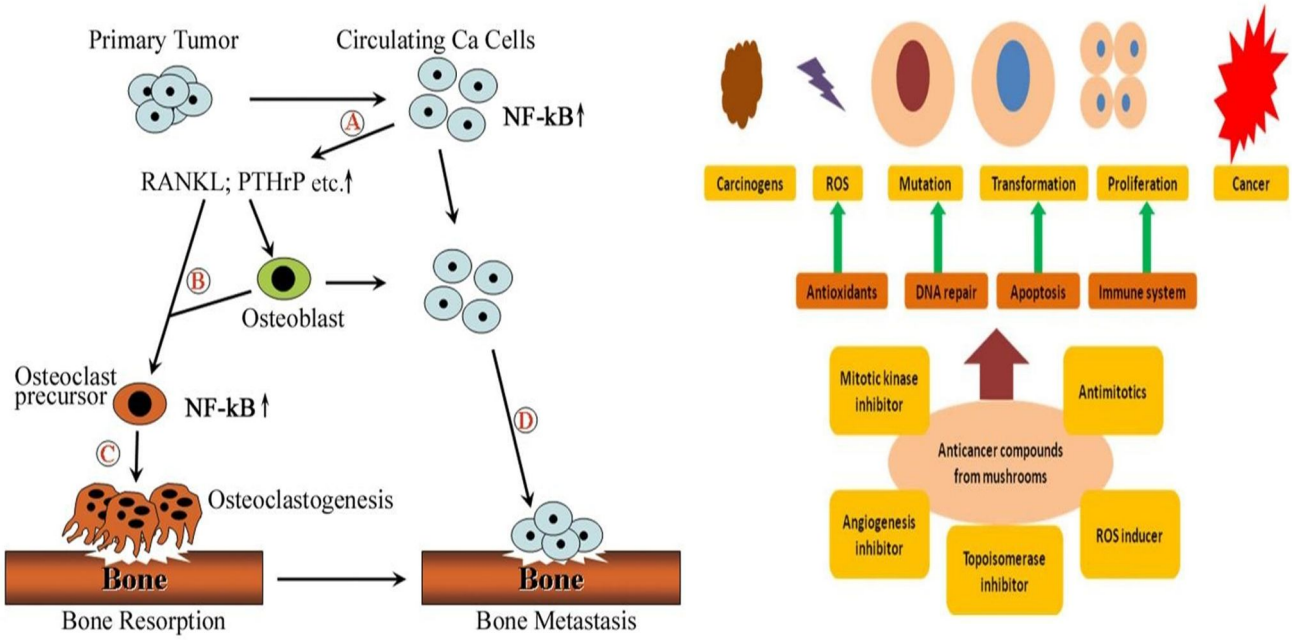


Figure 1.2: Anticancer mechanism of mushroom bioactive compound.

B. Antibacterial And Antifungal Action

Methanolic and ethanolic concentrates of Agaricus bisporus are in-vitro active against two pathogenic microbes Escherichia coli and Staphylococcus aureus following agar well dissemination technique utilizing various focuses (25, 50, 75 and 100 percent). Methanolic and ethanolic extracts showed powerful antibacterial movement against tried microorganisms. Methanolic extract showed the greatest inhibitory impact against the development of every one of the test bacteria. The antimicrobial impact of concentrates of A. bisporus was tried against Gram-positive and Gram-negative microscopic organisms and one type of yeast. The Gram-positive bacterium is more conspicuous. This may be because of the impact of temperature that upset the compound which is liable for the action.(Liu et al., 2024).

C. Immunomodulatory Exercises Of Polysaccharides Mushroom

Agaricus bisporus is a vital eatable and restorative mushroom. In this review, we methodically explored the monosaccharide organization, methylation, and immunomodulatory exercises of polysaccharides from A. bisporus fruiting bodies (FPS), refined mycelia (IPS), and maturation stock (EPS). The outcomes demonstrated that FPS was primarily made out of mannose; IPS, of glucose; and EPS, of galactose. Nonetheless, the methylation results demonstrated that FPS, IPS, and EPS had different polysaccharide structures. Moreover, FPS, IPS, and EPS caused striking expansions in the thymus and spleen files; in the measures of serum cytokines containing interleukin (IL)- 2, IL-4, cancer rot factor-α (TNF-α), and interferon-γ (IFN-γ); in the counts of CD3+CD4+ lymphocytes and the proportion of CD4+ to CD8+ T lymphocytes; notwithstanding, they diminished the includes of CD3+CD8+ lymphocytes in ordinary mice. At last, in cyclophosphamide-treated mice, the FPS, IPS, and EPS had the option to essentially reestablish the thymus and spleen records, lymphocyte multiplication, phagocytotic action of peritoneal macrophages, and levels of IL-2, IL-6, IL-10, IL-17, TNF-α, and immunoglobin G. These discoveries recommend that FPS, IPS, and EPS could be generally taken advantage of as immunomodulatory specialists and possible immunotherapeutic medications for patients with insufficient resistant capability (Yu et al.,2009).

D. Cardiovascular And Antihyperlipidemic Effect

The mushroom white button (Agaricus bisporus) contain bioactive mixtures that affect hypercholesterolemia and cardiovascular sicknesses. The hypercholesterolemia was prompted tentatively in abstained rodents through a high-fat eating routine alongside infusion of triton WR-1339. After 48 h, the treatment bunches were given concentrate for 28 days alongside standard eating routine. At the preliminary end, we broke down the glucose levels, cell reinforcement boundaries, lipid profile, and renal capability, as well as directing liver capability trial of the rodents.

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The outcomes demonstrated that positive benchmark group rodents displayed expanded degrees of all out cholesterol (TC), fatty oils (TG), low-thickness level (LDL), and exceptionally low-thickness level (vLDL) though treatment bunches that got 200 mg white button mushroom separates revealed decrease in TC, TG, vLDL, individually, and improvement in HDL level. The protein profiles of various gatherings showed non-huge contrasts, albeit both mushroom separates arrangement decreased glutamic oxaloacetic transaminase (GOT) and glutamic pyruvic transaminase (GPT) levels. By and large, the outcomes demonstrated that mushroom extricates were useful in keeping up with oxidative pressure and can possibly improve dyslipidemia in the tried rodent creature model (Iqbal et al., 2024).

E. Gastrointestinal Diseases

Agaricus bisporus is a popular consumable mushroom, and Agaricus bisporus polysaccharides (ABPs) and the two sanitized divisions (ABP-1 and ABP-2) tracked down that ABPs, ABP-1, and ABP-2 had remedial impacts against dextran sodium sulfate (DSS)- prompted colitis in mice. ABPs, ABP-1, and ABP-2 could alleviate body weight reduction, colon decay, and histological injury, increment tight intersection proteins, reestablish stomach obstruction capability, and hinder irritation. ABP-2 with a lower sub-atomic weight (1.76 × 104 Da) showed a prevalent remedial impact than ABP-1 with a higher atomic weight (8.86 × 106 Da). Besides, the impacts of ABP-1 and ABP-2 were microbiota-subordinate, which worked by initiating Norank_f__Muribaculaceae and Akkermansia and hindering Escherichia-Shigella and Proteus. Furthermore, untargeted waste metabolomic investigation uncovered unmistakable tweak examples of ABP-1 and ABP-2. ABP-1 fundamentally advanced steroid chemical biosynthesis, while ABP-2 essentially improved bile emission and tryptophan digestion. In outline, ABPs, particularly low-sub-atomic weight division, address novel prebiotics for treatment of fiery gastrointestinal sicknesses (Liu et al., 2024).

F. Antioxidant Activity

Agaricus bisporus had higher generally critical values for starches, all out cancer prevention agent content, absolute phenolic content, and aggregate cancer prevention agent limit, it very well may be expressed that Agaricus bisporuss are generally appropriate for human utilization which could likewise add to different medical advantages including supporting out immunity. The DPPH examine depends on the assessment of the cell reinforcements' capacity to search it. IC50 worth of Agaricus bisporus was found to be130.91 mg/ml which shows that it had cell reinforcement rummaging ability (Jegathchandran et al., 2024).

V. CONCLUSION

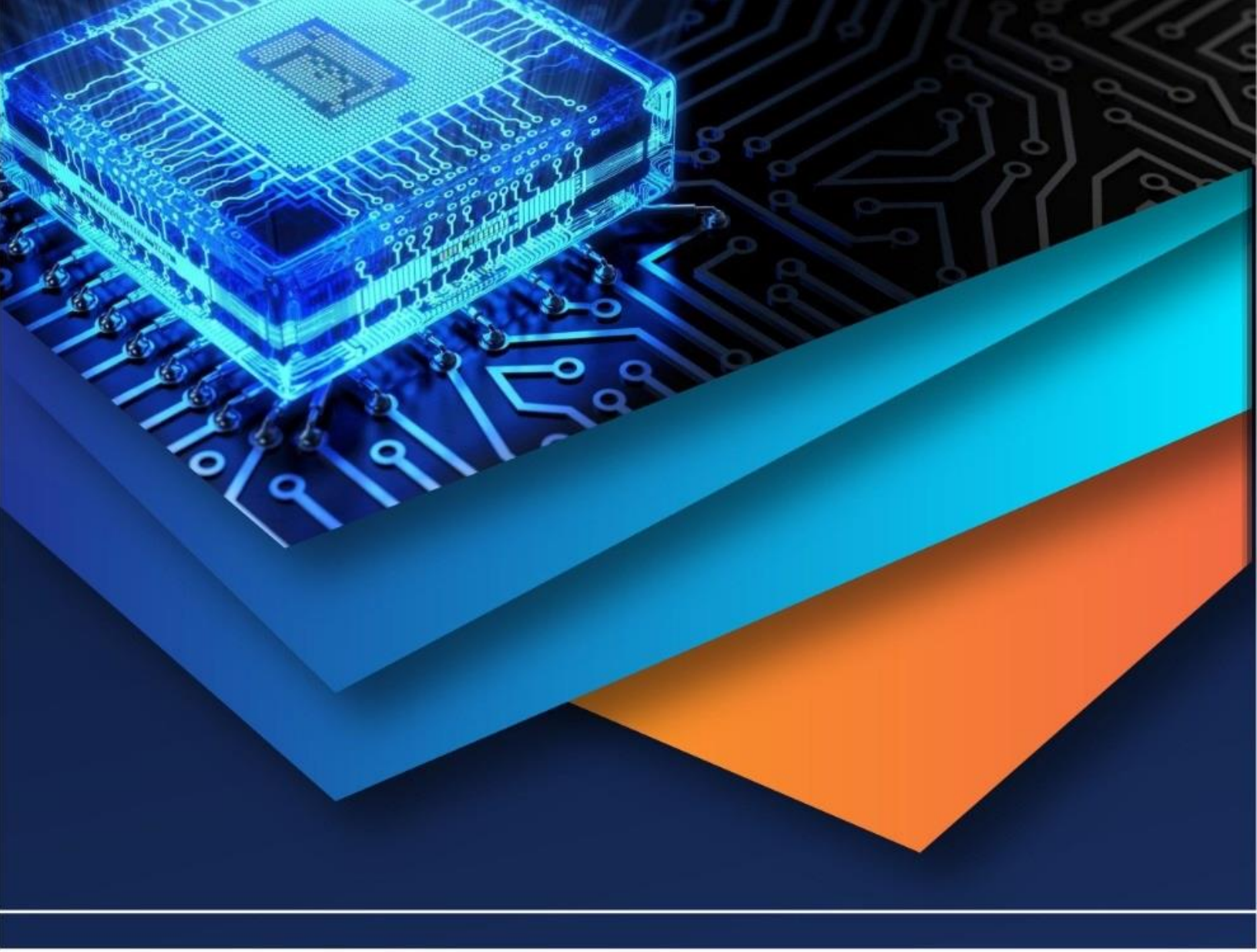
These days, mushrooms are important fixings because of the way that they are low in calories, starches, fat, and sodium: likewise, they are sans cholesterol. Also, mushrooms contain critical supplements, nutrients, and minerals, like selenium, potassium, riboflavin, niacin, diet D, proteins, and fiber. Numerous nutraceuticals are present in mushrooms, utilized for the anticipation or cure of Cardiovascular diseases, Cancer, immunomodulatory diseases, and gastrointestinal diseases like ulcerative colitus. They additionally are applied to decrease the likelihood of most diseases' attack and metastasis as a result of their antitumor properties. Mushrooms go about as antibacterial, insusceptibility enhancer, and LDL cholesterol diminishing specialists. Due to having different optional metabolites with particular bioactivity they can forestall and treat different infections. Bioactive parts of mushroom extrication are utilized to give human wellness and are utilized as nourishing enhancements. Accordingly, the advantages of mushrooms are indistinct and utilization of mushrooms for different objects has been drawing closer over for quite a long time.

REFERENCES

[1] Sadler, M. (2003). Nutritional properties of edible fungi. Nutrition Bulletin, 28(3).
[2] Iqbal, T., Sohaib, M., Iqbal, S., & Rehman, H. (2024). Exploring Therapeutic Potential of Pleurotus ostreatus and Agaricus bisporus Mushrooms against Hyperlipidemia and Oxidative Stress Using Animal Model. Foods, 13(5),
[3] Wasser, S. J. A. M. B. (2002). Medicinal mushrooms as a source of antitumor and immunomodulating polysaccharides. Applied microbiology and biotechnology, 60, 258-274.
[4] Denmeade, S. R., & Isaacs, J. T. (2002). A history of prostate cancer treatment. Nature Reviews Cancer, 2(5), 389-396.
[5] Feng, Y., Zhang, J., Wen, C., Dzah, C. S., Juliet, I. C., Duan, Y., & Zhang, H. (2020). Recent advances in Agaricus bisporus polysaccharides: Extraction, purification, physicochemical characterization and bioactivities. Process biochemistry, 94, 39-50.
[6] Feng, Y., Zhang, J., Wen, C., Dzah, C. S., Juliet, I. C., Duan, Y., & Zhang, H. (2020). Recent advances in Agaricus bisporus polysaccharides: Extraction, purification, physicochemical characterization and bioactivities. Process biochemistry, 94, 39-50.
[7] Gann, P. H., Ma, J., Giovannucci, E., Willett, W., Sacks, F. M., Hennekens, C. H., & Stampfer, M. J. (1999). Lower prostate cancer risk in men with elevated plasma lycopene levels: results of a prospective analysis. Cancer research, 59(6), 1225-1230.

[8] Liu, W., Wang, L., Yuan, Q., Hao, W., Wang, Y., Wu, D., ... & Wang, S. (2024). Agaricus bisporus polysaccharides ameliorate ulcerative colitis in mice by modulating gut microbiota and its metabolism. Food & Function, 15(3), 1191-1207.
[9] Denmeade, S. R., & Isaacs, J. T. (2002). A history of prostate cancer treatment. Nature Reviews Cancer, 2(5), 389-396.
[10] Kurahashi, N., Iwasaki, M., Sasazuki, S., Otani, T., Inoue, M., Tsugane, S., & Japan Public Health Center–Based Prospective Study Group. (2007). Soy product and isoflavone consumption in relation to prostate cancer in Japanese men. Cancer Epidemiology Biomarkers & Prevention, 16(3), 538-545.
[11] Giovannucci, E., Rimm, E. B., Liu, Y., Stampfer, M. J., & Willett, W. C. (2002). A prospective study of tomato products, lycopene, and prostate cancer risk. JOURNAL-NATIONAL CANCER INSTITUTE, 94(5), 391-398.
[12] Chen, S., Oh, S. R., Phung, S., Hur, G., Ye, J. J., Kwok, S. L., ... & Williams, D. (2006). Anti-aromatase activity of phytochemicals in white button mushrooms (Agaricus bisporus). Cancer research, 66(24), 12026-12034.
[13] Adams, L. S., Chen, S., Phung, S., Wu, X., & Ki, L. (2008). White button mushroom (Agaricus bisporus) exhibits antiproliferative and proapoptotic properties and inhibits prostate tumor growth in athymic mice. Nutrition and cancer, 60(6), 744-756.
[14] Yu, C. H., Kan, S. F., Shu, C. H., Lu, T. J., Sun-Hwang, L., & Wang, P. S. (2009). Inhibitory mechanisms of Agaricus blazei Murill on the growth of prostate cancer in vitro and in vivo. The Journal of nutritional biochemistry, 20(10), 753-764.
[15] Martin, K. R., & Brophy, S. K. (2010). Commonly consumed and specialty dietary mushrooms reduce cellular proliferation in MCF-7 human breast cancer cells. Experimental biology and medicine, 235(11), 1306-1314.
[16] Gu, Y. H., & Sivam, G. (2006). Cytotoxic effect of oyster mushroom Pleurotus ostreatus on human androgen-independent prostate cancer PC-3 cells. Journal of medicinal food, 9(2), 196-204.
[17] Rossetto, D., Truman, A. W., Kron, S. J., & Côté, J. (2010). Epigenetic modifications in double-strand break DNA damage signaling and repair. Clinical Cancer Research, 16(18), 4543-4552.
[18] Mathas, S., Lietz, A., Janz, M., Hinz, M., Jundt, F., Scheidereit, C., ... & Dorken, B. (2002, November). Inhibition of NF-kappaB essentially contributes to arsenic-induced apoptosis. In Blood (Vol. 100, No. 11, pp. 353A-353A). 1900 M STREET. NW SUITE 200, WASHINGTON, DC 20036 USA: AMER SOC HEMATOLOGY.
[19] Deveraux, Q. L., Roy, N., Stennicke, H. R., Van Arsdale, T., Zhou, Q., Srinivasula, S. M., ... & Reed, J. C. (1998). IAPs block apoptotic events induced by caspase-8 and cytochrome c by direct inhibition of distinct caspases. The EMBO journal.
[20] Baldi, A., Piccolo, M. T., Boccellino, M. R., Donizetti, A., Cardillo, I., La Porta, R., ... & Crispi, S. (2011). Apoptosis induced by piroxicam plus cisplatin combined treatment is triggered by p21 in mesothelioma. PloS one, 6(8), e23569.
[21] Bentires-Alj, M., Dejardin, E., Viatour, P., Van Lint, C., Froesch, B., Reed, J. C., ... & Bours, V. (2001). Inhibition of the NF-κB transcription factor increases Bax expression in cancer cell lines. Oncogene, 20(22), 2805-2813.
[22] Baldwin, A. S. (2001). Control of oncogenesis and cancer therapy resistance by the transcription factor NF-κB. The Journal of clinical investigation, 107(3), 241-246.
[23] Lin, A. (2003). Activation of the JNK signaling pathway: breaking the brake on apoptosis. Bioessays, 25(1), 17-24.
[24] Stuart, E. C., Scandlyn, M. J., & Rosengren, R. J. (2006). Role of epigallocatechin gallate (EGCG) in the treatment of breast and prostate cancer. Life sciences, 79(25), 2329-2336.
[25] Yang, G. Y., Liao, J., Kim, K., Yurkow, E. J., & Yang, C. S. (1998). Inhibition of growth and induction of apoptosis in human cancer cell lines by tea polyphenols. Carcinogenesis, 19(4), 611-616.
[26] Lambert, J. D., & Yang, C. S. (2003). Mechanisms of cancer prevention by tea constituents. The Journal of nutrition, 133(10), 3262S-3267S.
[27] Vayalil, P. K., & Katiyar, S. K. (2004). Treatment of epigallocatechin-3-gallate inhibits matrix metalloproteinases-2 and-9 via inhibition of activation of mitogen-activated protein kinases, c-jun and NF-κB in human prostate carcinoma DU-145 cells. The Prostate, 59(1), 33-42.
[28] Bellas, R. E.; Fitzgerald, M. J.; Fausto, N.; Sonenshein, G. E. Inhibition of NF-κB activity induces apoptosis in murine hepatocytes. American Journal Of Pathology 1997, 151, 891–896.

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