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MARVELOUS MEDICINAL MUSHROOMS

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ABSTRACT

The significance of high-quality nutrition has long been known in relation to preventing numerous human health problems and the palatability of healthy foods are increasingly appreciated. Mushrooms are the heterotrophic macro fungi and their nutritional properties made them a better-quality dietary food. Its products bestow improvement of the human immune system and thereby known to increase disease resistance. Identification of new compounds from mushrooms which can aid to develop nutritional supplements needs to be encouraged. Medicinal mushrooms have plenty of novel bioactive compounds that are significant for enhancement of human life. In current scenario, global utilization of these mushrooms gained importance in glimpse and bloom of its vital role in modern medicine. Though several mushrooms have been studied for their usage in medicinal purpose, this review provides insight into prospective implications of medicinal mushroom applications.

KEY WORDS

Macro fungi, Nutritional property, Medicinal mushrooms, Mushroom research, Health benefits, Therapeutic usage.

INTRODUCTION

Humans are constantly searching worldwide for the development of new therapeutic agents especially from natural sources. Nature has blessed mankind with diverse biota that creates an opportunity for potential findings. The same strategy can be more easily achieved using microbial origin. Beneficial microorganisms have valuable sources of compounds which influences human health either by direct or indirect ways. Mushrooms are a special group of macro fungi and are premier recyclers on the planet. According to recent estimates, mushrooms constitute at least 12,000 species in the ecosystem and 2,000 species are reported as edible among the known. About 35 edible mushroom species are commercially cultivated and nearly 200 species were collected from wild and used for medicinal purposes.

After the discovery of the first wonder drug, Penicillin from filamentous fungi much more attention has been carried out in therapeutic usage of fungus especially from medicinal mushrooms. The fruiting body of mushroom contains excellent source of nutrients, high proteins, low in calories, rich in minerals, fibers, essential amino acids and vitamins are considered as a vegetable meat. The modern cultivation technology has been implicated for economic growth of edible mushrooms. With an

intensive advanced research in mushroom biology there is growing awareness about the utilization of high quality nutritional and medicinal mushrooms. The bioactive ingredients found in medicinal mushrooms are natural, simpler and make them easily ingestible in body system. At present, there is an enormous covenant of public interest in the use of medicinal mushrooms for health and healing.The future challenge is to correlate the significance of these mushrooms in healing the dreadful diseases of mankind.

Mushroom research and development: Present scenario

Edible mushrooms are widely used for industrial purposes like other microorganisms for the production of valuable substance. Mushroom biotechnology deals with the principles of mushroom biology and bioprocess technology to develop safe mushroom medicinal products. Though, the progress of mushroom technology has achieved tremendous improvement that allowed the scientist to address various issues raised for the new developmental approach. In order to increase the utility of mushroom, it is necessary to develop the following areas of concern.

1. Production strain selection
2. Techniques in strain improvement
3. Optimization of growth parameter
4. Post harvesting technology
5. Marketing surveillance

Significant increases in the medicinal mushroom research and development were initiated especially during last four decades. The current scenario of mushroom production is fully exploited using standard cultivation methodology. About 5 million tons of mushrooms are now commercially cultivated in more than 100 countries. China is the major producer of edible mushroom and accounts for over 64% of global production.

It is generally recognized that in order to maintain high-yielding strains, the techniques employed in mushroom breeding should be frequently modified and improved by new findings, particularly in the field of Microbial biotechnology and Genetics. Development of economic cultivation technology, selection of disease resistance strains and formulation of cheap substrates has been studied in detail and recommended to mushroom growers to achieve the high yield target. As a result of this current research, 25% of the yield is increased in mushroom production.

Mushrooms are not only considered as a nutritious protein-rich food but also serves as a potential source for producing pharmaceutical and nutraceutical compounds. Assuming that the proportion of useful mushrooms among the unknown shall be only 5 % and may be thousands of mushroom species yet to be discovered having possible benefits to human kind. However, valuable health benefits could be obtained from many edible and even non-edible mushrooms. Hence, there is a need to evaluate novel bioactive compounds which has drawn more attraction of researchers now days. The research area in mushroom science especially on medicinal mushrooms is now focused on characterization of such pharmaceutically important novel compounds. From a medical point of view, we have now realized the importance and benefits of mushrooms usage. In order to meet our future challenges, more innovative approaches in successful development of medicinal mushroom is essential. If research is geared up in right direction, certainly mushroom technology will bloom revealing the magic of health and healing.

Health benefits of Medicinal mushrooms

Traditionally, mushroom has been used as a delicacy for many centuries throughout the world. It has been shown that constant intake of either mushrooms or mushroom nutraceuticals (dietary supplements) can make people healthy and fit. It is conventionally used in many countries particularly in Asian countries like China, Japan and India to indulgence common diseases such as atherosclerosis, hepatitis, hyperlipidemia, diabetes, dermatitis and cancer. Due to the presence of its high protein, fiber with low fat contents which aid the dietician choice as a food for health related problems. Mushrooms such as Lingzhi (*Ganodermalucidum*), Shiitake (*Lentinulaedodes*) and Yiner (*Tremellafuciformis*) have been used by traditional healers. The common bioactive compound present in the mushroom includes polysaccharides, triterpeniods, glycoprotein and antibiotics. In particular, the presences of polysaccharides have been proved as potential antitumor and immune modulating properties. There have been a number of studies suggesting the possible role of these mushrooms with immune modulating, anti-diabetic, anti-tumor, anti-viral, and anti-inflammatory activities.

Nutraceutical attributes of Mushrooms

Edible mushrooms are good source of protein rich food, enriched minerals,B-complex vitamins, riboflavin, niacin, thiamin, folic acid, pantothenic acid, vitamins C and D. Mushrooms can be served as potential prebiotics which contains carbohydrates like chitin, hemicellulose, Beta-glucans, mannans, xylans and galactans which enhance the immune function as well as improve digestion.The nutritional benefits of edible Oyster mushroom have high protein, low fat and also a natural source of bioactive compound lovastatin, a chemical used in pharmaceutical drugs to reduce the total cholesterol level in human and as an important food supplement for patients suffering from hypercholesterolemia. *Grifolafrondosa*has more protein content, a high proportion of unsaturated fatty acids, vitamin including B_1, B_2,C, D, Niacin and minerals. Shiitake has rich in several anti-oxidants, anti-tumor substances and cardiovascular benefits.

Dried and whole mushroom have been utilized in traditional medicine since long time. The mushroom, *G.lucidum*has 400 different bioactive compounds which were extracted from the fruiting body, mycelia and spores. The bio active compounds especially polysaccharides, organic germanium, triterpenoids and ganoderic essence shows a significant health benefit. It reduces the incidence of tumor and also recommended as a chemo preventive agent against cancer. Numerous reports suggested its anti-viral, anti-inflammatory and immunomodulating activities.The extract of this mushroom protect DNA damage related with free radicals and radiation.Novel bioactive molecules isolated from Shiitake known as lentinan (“Elixir of Life”) has been licensed as an anti-cancer drug by Japanese FDA which has proved to heal on bowel cancer, liver cancer, stomach cancer, ovarian cancer and lung cancer. Its immune modulating activity shows increased host resistance to bacterial and viral infections. Lenthionine, a cyclic organosulfur compound of Shiitake mushrooms has antimicrobial activity.

The mushroom, *Flammulinavelutipes*has a major polysaccharide named flammulin which is proved to have an effective anti-tumor property. Frequent consumption of Enoki mushroom reduces cancer rate in the community of the Nagano city in Japan was recorded. The experiment of this mushroom extract also proved that it can be used for the treatment of liver diseases and gastric ulcer. Grifolan, a polysaccharide from Maitake mushroom (*Grifolafrondosa*) has been commercialized as a

chemo preventive agent against cancer. Moreover, it improves the body immune system by activates helper T cells, cytotoxic T cells, natural killer cells and macrophages in the treatment of breast, liver and lung cancer. It has anti-diabetic properties and reduces some side effects of anti-cancer drugs such as hair loss, pain, nausea etc.

Anti-cancerous properties and chemo preventive activity in *Agaricus* mushroom was confirmed by The Japanese Cancer Association and the Japanese Pharmacological Society. *Hericiumerinaceus*is used for the treatment of gastric and esophageal carcinoma and ingestion of this mushroom extending the life of cancer-ridden patients. *Tremellafusiformis* extracts are used to protect liver cells from radiation damage. Anti-inflammatory, anti-viral and antioxidant activities had also been reported from *Pleurotus* mushroom. Bioactive compounds which aid fibrinolysis were isolated from variety of medicinal mushrooms which substantiate their significant role in treating cardiovascular diseases. Chitosan have been extracted from several mushrooms such as *Pleurotusostreatus, Agaricushortensis* and *Lycoperdonperlatum* which exhibit attractive role in multiple industrial applications, pharmacological, biomedicine and cosmetic fields. All these research has strongly recommended that medicinal mushrooms can be used as a potential source for the development of new therapeutic agents.

CONCLUSION

The increasing global population in the twenty-first century demands high quality food with health care. Mushroom has been recognized as an alternative potential source of food and medicine to overcome the needs. More research in this area, may lead to the development of new cultivation technology using mushroom biotechnology hence, larger quantities of novel mushrooms can be massively harvested. There is an urgent need to study the medicinal importance of wild mushrooms and it creates an opportunity for scientists to elucidate the active principle behind these mushrooms. Besides research, extension activities for exploration and establishment of medicinal mushroom farms need to be initiated. Furthermore, a healthy diet formulation can be generated which provides bioactive ingredients that promote human health and healing potential. According to the father of Medicine, Hippocrates, “Let food is your medicine and medicine is your food”, it may be concluded that mushrooms are the most potent, natural immune force ever discovered and hence it can be considered as a priceless asset for human welfare.

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