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Review Article

Wild Mushrooms: The Neglected Fungi in Ethiopia

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Abstract

Meeting the growing food needs of the world's population is a major challenge for our Ethiopian democracy in this time of crisis. In addition, widespread malnutrition and associated diseases are very common in economically poor people. This forces us to look for other cheap and high-quality food options for most of our people. A non-green alternative called mushroom cultivation is one of the best ways to address this challenge because mushrooms grow on litter without needing extra soil without their unique nutritional and medicinal properties.

***Keywords**: Mushroom; Nutrition; Medicinal Value; Edible*

Introduction

Eukaryotic mushroom heterotrophic organisms are described as macrofungi with a fruiting body composed of a cap and stem [1]. These macrofungi contain many species of *Basidiomycota* [2]. Mushrooms are filamentous fungi with a cycle of sexual and asexual reproduction. A feature of basidiomycetes is a structure that produces seeds or a fruit-bearing body called a basidium. The morphological unit of the basidium is hyphae and the bulk of the hyphae is called mycelium. The seeds produced inside the basidium are called basidiospores and are responsible for their reproduction and distribution. Sexual reproduction begins when the basidiospore grows and grows as a haploid mycelium in appropriate environmental conditions [3,4]. Mushrooms are commonly known as edible and inedible macrofungi. Edible and edible mushrooms can be distinguished based on morphological factors such as color, appearance and shape of the cap [5].

In recent years, many studies have reported that mushrooms have extremely nutritious properties such as vitamins, fats, proteins and so on. They also have high therapeutic properties that can be used as antioxidant, anticancer, antidiabetic, cardiovascular protector and hepatoprotective effects [2]. In addition, mushrooms can be used as potential sources of peptides, vitamins, proteins, lipids, amino acids, fiber and antimicrobial compounds [6]. In the last 20 years, most of the food industry could use mushrooms as a food product to prepare different types of jam, cucumbers, sweets, etc [7].

Nutritional values of mushrooms

Ethiopian cuisine is mainly based on cereals (wheat, rice and corn), which are low in protein. The addition of a mushroom recipe to the Ethiopian diet will close the protein gap and improve the overall health of the economically and economically disadvantaged communities. In the past, mushrooms were considered an important vegetable and were popular with wealthy people for cooking purposes. Currently most ordinary people consider mushrooms a quality food because of their health benefits [8].

Mushroom is considered a complete, healthy and suitable food for all age groups, children to adults. The nutritional value of mushrooms is influenced by many factors such as animal species, growth stage and environmental conditions. Mushrooms are rich in protein, dietary fiber, vitamins and minerals. The digestible profile of digestible mushrooms includes starch, pentose, hexose, disaccharides, amino sugars, alcoholic beverages and sugar acids. The total amount of carbohydrates in mushrooms varies from 26 - 82% based on the dry weight in different mushrooms. The composition of the raw fiber of the mushroom contains polysaccharides and slightly digested chitin [9].

Edible mushrooms usually have low lipid content and a high proportion of polyunsaturated fats. All of these result in a lower calorie harvest from a mushroom diet. Mushrooms do not have cholesterol. Instead, they contain ergosterol which acts as a precursor to Vit-D synthesis in the human body. The protein content of edible mushrooms is generally high, but very varied. The raw protein of mushrooms varies from 12 - 35% depending on the variety. The composition of free amino acids varies greatly but is usually rich in threonine and valine but is deficient in sulfur-containing amino acids (methionine and cysteine). Nutritional values of different mushrooms are provided in table 1 [10-13].

Mushroom	Carbohydrate	Fiber	Protein	Fat	Ash	Energy k cal
Agaricus bit porous	46.17	20.90	33.48	3.10	5.70	499
Pleurotus sajor-caju	63.40	48.60	19.23	2.70	6.32	412
Lentinula edodes	47.60	28.80	32.93	3.73	5.20	387
Pleurotus ostreatus	57.60	8.70	30.40	2.20	9.80	265
Vovarella volvaceae	54.80	5.50	37.50	2.60	1.10	305
Calocybe indica	64.26	3.40	17.69	4.10	7.43	391
Flammulina velutipes	73.10	3.70	17.60	1.90	7.40	378
Auricularia auricula	82.80	19.80	4.20	8.30	4.70	351

Table 1: *Nutritive values of different mushrooms (dry weight basis g/100g).*

Mushrooms contain about eighty to ninety percent water, and eight to ten percent fibers. In addition, mushrooms are an excellent source of vitamins C and B (Folic acid, Thiamine, Riboflavin and Niacin). Minerals namely, potassium, sodium and phosphorus are high in the bodies of mushroom fruit. It also contains some important minerals (Cu, Zn and Mg) in the sources but does not contain iron and calcium.

Medicinal values

For thousands of years, edible fungi have been revered for their great health benefits and are widely used in traditional medicine. Certain biochemical compounds in mushrooms are responsible for improving human health in many ways. These bioactive compounds include polysaccharides, tri-terpenoids, low molecular weight proteins, glycoproteins and immunomodulating compounds. Mushrooms have therefore been shown to promote immune function; improve health; reduce the risk of cancer; inhibit plant growth; help measure blood sugar; prevent germs, bacteria and fungi; reduce inflammation and support ways of removing toxins from the body. Increased recognition of fungi in traditional medicine is also well-known for combating many diseases. The therapeutic values of some important mushrooms are given in table 2 [14-28].

Mushroom	Compounds	Medicinal properties
Ganoderma lucidum	Ganoderic acid Beta-glucan	Augments immune system Liver protection Antibiotic properties Inhibits cholesterol synthesis
Lentinula edodes	Eritadenine Lentinan	Lower cholesterol Anti-cancer agent
A. bit porous	Lectins	Enhance insulin secretion
P. sajor-caju	Lovastatin	Lower cholesterol
G. frondosa	Polysaccharide Lectins	Increases insulin secretion, Decreases blood glucose
Auricularia auricula	Acidic polysaccharides	Decrease blood glucose
Flammulina velutipes	Ergothioneine Proflamin	Antioxidant Anti-cancer activity
Trametes versicolor	Polysaccharide-K (Kresin)	Decrease immune system depression
Cordyceps sinensis	Cordycepin	Cure lung infections Hypoglycemic activity Cellular health properties Anti-depressant activity

Table 2: *Medicinal values of some important mushroom.*

Good for the heart

Edible mushrooms are low in saturated fat and high in cholesterol and are therefore a good choice for heart patients and the treatment of cardiovascular disease. Low-sodium potassium-rich mushrooms improve salt balance and maintain blood circulation in humans. Therefore, mushrooms are suitable for people with high blood pressure. Regular use of mushrooms such as *Lentinula* and *Pleurotus* spp was strong enough to lower cholesterol levels.

Low-calorie food

Patients with diabetes prefer mushrooms as a healthy diet because of their low-calorie content, low starch, and low fat and sugar. The pure protein found in mushrooms helps to lower cholesterol in the body. It is therefore the most preferred diet for people who are struggling to lose their extra weight [28].

Prevents cancer

Ingredients that limit plant function are found in some mushrooms but only a limited number have been tested. All kinds of edible mushrooms, as well as especially white buttons, can prevent prostate and breast cancer. New mushrooms can inhibit the action of 5-alpha-reductase and aromatase, chemicals that are responsible for the growth of cancerous growths. The drug, known as Polysaccharide-K (Kresin), is isolated from *Trametes versicolor* (*Coriolus versicolor*), which is used as a leading cancer drug. Some polysaccharides found in mushrooms have the potential to reduce the side effects of radiotherapy and chemotherapy. Such results have been clinically confirmed in mushrooms such as *Lentinula edodes, Trametes versicolor*, *Agaricus* bit porous and others [29].

Anti-aging property

Polysaccharides from mushroom scavengers are powerful super superoxide free radicals. These antioxidants inhibit the action of free radicals in the body, thereby slowing down the aging process. Ergothioneine is a specific antioxidant found in *Flammulina velutipes* and *Agaricus bisporus* needed for healthy eyes, kidneys, bone marrow, liver and skin [30].

Regulates digestive system

Fermentable fiber and oligosaccharides from mushrooms act as prebiotics in the gut and thus strengthen the beneficial bacteria in the colon. This dietary fiber aids in the digestive system and the healthy functioning of the digestive system [31].

Strengthens immunity

Mushrooms can strengthen the immune system. A variety of polysaccharides (beta-glucans) and minerals are separated from the mushrooms responsible for regulating the immune system. These compounds facilitate reproductive (indirect) and immune (direct) immune responses and utilize all types of immune cells.

Mushrooms, like plants, have great potential for food quality production. These are a source of bioactive metabolites and are a major source of drugs. Advances in knowledge in biochemistry, biotechnology and molecular biology improve the use of mushrooms in medical science. With full consideration, edible mushrooms and their products may provide the most delicious, nutritious and healthy food without its medicinal benefits [32].

There are still enough challenges to come. To date, how these products work is unclear and many potential wild mushrooms have not been studied. The use of mycelia is less noticeable but more potent, as it can be produced year-round at a specified rate. Information about the need for capacity, route, duration, procedure and location will also not be available. Work is underway in various laboratories around the world to ensure these therapeutic properties and the separation of new ingredients. If these challenges come together in the coming days, the mushroom industry will play a key role in the nutraceutical and pharmaceutical industries. Increased awareness of the high number of healthy foods associated with medicinal properties means that mushrooms will be an important food in the coming days and in areas they may emerge as a vegetarian diet. Growing mushrooms is economically and environmentally beneficial. Eating mushrooms is beneficial in all aspects of life [33].

Conclusion

Mushrooms are very useful as a dietary supplement and are suitable for all age groups due to their high content of protein, dietary fiber, vitamins and minerals. In addition, they contain various bioactive molecules such as polysaccharides; terpenoids, glycoprotein, antimicrobial compounds, antioxidants, etc. can play a significant role in the treatment of many ailments such as improved immune system, lowering the level of cancer in the body, lowering blood sugar. We found that few mushrooms produce various bioactive phenolic compounds such as pyrogallol, polysaccharides, flavonols, ascorbic acid, and carotenoid compounds that can be used to control various diseases such as antitumor, antimicrobial, antioxidant and anti-hypertensive, hypocholesterolemic and hepatoprotective activity.

Author Contribution

MD: conceptualization, methodology, fieldwork, data analysis, writing of manuscript; review and editing of manuscript. The author read and approved the final manuscript.

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Conflict of Interest

The authors declare that no conflict of interest for this publication.

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