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A Review Medicinal Potentials of Some Mushrooms and Challenges of Mushroom Medicine

Bassey, Hasadiah Okon

Department of Plant Science and Biotechnology, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

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ABSTRACT: The use of mushroom in traditional ancient therapies dates back at least to the Neolithic age. For millennia, mushrooms have been valued as edible and medicinal provisions for man. There are more than 50 species of mushrooms with a wide range of therapeutic properties, which are referred to as medicinal mushrooms, including the most popular Ganodermalucidum(reishi), Lentinulaedodes(shiitake) and Pleurotusostreatus(oyster mushroom). They contain a variety of biologically active compounds, among which the most important are polysaccharides, i.e. β-glucans, as well as triterpenes, polyphenols, proteins, and others, that have been scientifically proven to possess a broad spectrum of pharmacological activities. Several β-glucan compounds derived from medicinal mushrooms are approved as anticancer medicines and employed clinically in Japan, such as lentinan from Lentinulaedodesand PSK from Trametesversicolor(turkey tail). Medicinal mushrooms generally strengthen the immune system and thus exhibit anticancer activity, particularly when used as a complementary therapy alongside conventional treatment (chemotherapy and radiotherapy). Furthermore, they have antioxidant, anti-inflammatory and anti-allergic properties, they regulate blood sugar and cholesterol levels as well as blood pressure, thus can help prevent diabetes, hypertension and cardiovascular disease. Mushrooms can protect against viral and other infections and are a potential source of new antibiotic compounds. The medicinal potentials of mushroom are endless as the different species have been studied extensively by researchers. In the study of medicinal mushroom there are also challenges faced by the researchers. Challenges such as; inability to identify poisonous species, the seasonal nature of mushrooms, as well as, their inability to produce fruit-bodies in pure culture and so much more. The aim of this seminar review is to give a broad overview of the potentials and challenges of medicinal mushrooms

I. INTRODUCTION

Mushrooms are macro fungi with distinctive fruiting-bodies, which can be hypogeous or epigeous, large enough to be seen with the naked eye and to be picked by hand (Chang and Miles, 1992).Mushroom medicine are comparable to "medicinal plant" and are described as active ingredients of macroscopic fungi, mostly higher basidiomycetes and some ascomycetes, which are used whole, in form of extracts or powder for prevention and alleviation or healing of diseases and /or in providing a balanced healthy diet(Dai, et al 2009). Mushrooms have long been used as a valuable food source and as traditional medicines around the world, especially in Japan and China.

Records of health promoting properties such as antioxidant, antimicrobial, anticancer, cholesterol lowering and immune stimulatory effects have been reported for some species of mushrooms (Lorenzen and Anke, 1998).The health enhancing properties of mushrooms have been attributed to the presence of bioactive compounds.Bioactive compounds include polysaccharides, glycolipids, compounds derived from shikimic acid, aromatic phenols, fatty acid derivatives, polyacetylamine, polyketides, nucleosides, sesterterpenes, and many other substances of different origins (Lorenzen and Anke, 1998).Some common species of mushroom commonly used for ethno-medicinal purposes include; Pleurotus, Lentinula, Agaricus, Auricularia, Ganoderma, Pycnoporus, Coriolus,etc (Chang and Miles, 1992).

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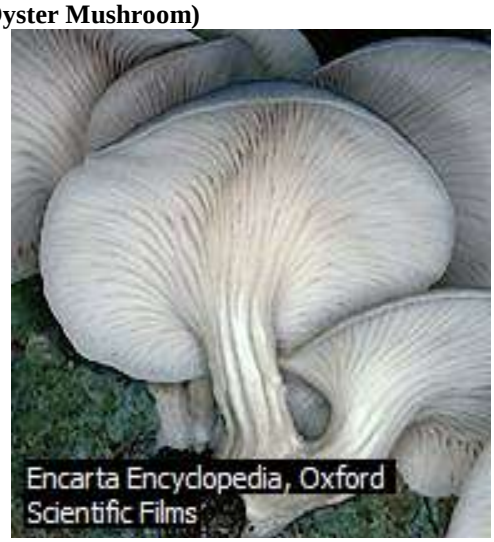
Medicinal Potentials Of Trametes Versicolor (Turkey Tails)

Source:www.Mushroomtable.com

- Trametesversicolor or Coriolusversicolor is one of the most studied and clinically important medicinal mushrooms used for the treatment of a variety of cancers.
- Its principal active ingredients are two polysaccharides with Beta-1, 4-glucan as its principle constituents. It is used as one of the primary anti-cancer agents in Japan, primarily in the proprietary form known as Krestin. Trametes also contains various sterols, including beta-sitosterol and ergosterol (Kidd, 2000).
- Anti-cancer action: PSK (polysaccharide-K) has been shown to be effective against several cancers, including cervical cancer, in combination with other therapeutic agents.
- PSP (Polysaccharide-peptide) significantly lessened the side effects of conventional medical protocols used in the treatment of cancers of the esophagus, stomach and lungs (Kidd, 2000).
- Cardiovascular health: Lowered cholesterol in animal studies (Borcherset al., 1999).
- Immune enhancement: PSK increases interferon production, as well as scavenging superoxide and hydroxyl free radicals, has demonstrated anti-viral activity, possibly even inhibiting HIV infection (Borcherset al., 1999).

Medicinal Potentials Of Pleurotus Ostreatus (Oyster Mushroom)



- Pleurotusostreatus is one of the most popular and widespread cultivated edible mushrooms, which has, in addition to good taste, relatively high nutritional value and is easy to grow.
- The mushroom contains terpenes, lectin, proteins, lovastatin, pleuran, β-glucans, unsaturated fatty acids and ergosterol (provitamin D2), and other compounds with potential antitumour properties, as well as antibiotic and fungicidal activities (Gunde-Cimerman, 1999).
- Clinical studies have shown that Pleurotusostreatusreduces cholesterol and triglyceride levels, without any deleterious effect on the liver and kidney (Khatunet al., 2007).
- The hypocholesterolaemic activity is due to the combined action of dietary fibre and primarily of a natural statin lovastatin or mevinolin, the most important pharmacologically active compound in Pleurotusostreatus, which inhibits cholesterol synthesis.
- It has been proposed that the addition of 5% dried Pleurotusostreatus to a high-cholesterol diet could effectively improve blood lipid profile (Gunde-Cimerman and Plemenitaš, 2001).
- The mushroom also reduced blood sugar levels, as well as systolic and diastolic blood pressure in patients with type 2 diabetes and high blood pressure (hypertension) (Choudhuryetal., 2013; Khatunet al., 2007).

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Medicinal Potentials Of Lentinula Edodes (Shiitake)

source: Internet

- Lentinulaedodes or shiitake, which is its Japanese and most common name worldwide, is a delicious and very popular edible and medicinal mushroom of high nutritional value.
- It is the source of two very well-studied extracts of proven pharmacological value: lentinan and LEM (LentinulaEdodes Mycelium Extract), over 25% proteins (dry weight),contains all the essential amino acids (lysine and arginine are especially plentiful), B-complex vitamins, vitamin C, ergosterol, minerals enzymes, carbohydrates and lipids (Lorenzen and Anke, 1998).
- Lentinulaedodes has a number of therapeutic properties strengthens the immune system, exhibits antitumour activity, prevents cardiovascular disease and diabetes.
- It also possesses antioxidant, anti-inflammatory, liver protective (hepatoprotective) properties, and helps with bronchitis and allergies.
- It displayed activity against viral, bacterial, fungal and parasitic infections, such as candidiasis, common cold and influenza.
- Lentinulaedodes administration to patients with high blood cholesterol (hypercholesterolaemia) and other lipids (hyperlipidaemia) led to a decrease in total cholesterol of 7–12% and triglycerides of 6–7% (Grienkeet al., 2014).

Medicinal Potentials Of Auricularia Auricula (Wood Ear)

source: Internet

- Auriculariaauriculais highly valued in East Asian cuisine for its crunchy, rubbery texture, and have long been known healing properties in China and Europe.
- Active constituents: Polysaccharides (mannan, glucuronic acid and methyl pentose), lecithin, cephalin, ergosterol, sphingomyelin.
- It has traditionally been used mostly in inflammation of the throat and eye irritations (Hobbs, 1986).
- Scientific studies have shown that Auriculariaauriculapossess cardiovascular protective properties attributed to the antioxidant activity of polyphenols and to polysaccharides, major pharmacologically active compounds in these mushrooms.
- Auriculariaauricula polysaccharides have been shown to reduce levels of total cholesterol, triglycerides and LDL (bad) cholesterol, and increase HDL (good) cholesterol.
- They also increased the antioxidant capacity and exhibited potential cardioprotective, anti-atherosclerotic and antithrombotic properties.
- The polysaccharides present in this mushroom also exhibited anti-inflammatory activity, which corresponds to the traditional use of the mushroom (Chen et al., 2008).

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Medicinal Potentials Of Ganoderma Lucidum(Reishi)

source: Internet

- Ganodermalucidum is the most famous and highly regarded of all medicinal mushrooms due to its wide range of medicinal properties.

It has a wide variety of active components, including alkaloids, proteins, amino acids, polysaccharides (including Beta-D-glucans), ergosterol and other sterols, triterpenes, nucleosides (including adenosine), volatile oils, minerals, vitamins and lipids (Gaoet al., 2004a).

- Ganodermalucidum has traditionally been used to improve overall health and immunity.
- Athletic performance: Enhances oxygenation of the blood, reducing and preventing altitude sickness in high altitude mountain climbers.
- Cardiovascular health: Lowers cholesterol levels, reduced blood and plasma viscosity in a controlled study of patients with high blood pressure and high cholesterol (Gaoet al., 2004).
- Liver health: Reduced liver enzyme levels (SGOT and SGPT) in hepatitis B patients.
- Respiratory health: 60-90 % of 3,000 patients with chronic bronchitis showed clinical improvement, especially older patients with bronchial asthma. Regenerates bronchial epithelium (bronchial tract lining) (Hobbs, 1986).

It is also useful for analgesic, anti-inflammatory; liver detoxification and protective actions.

Challenges Of Mushroom Medicine

- Some mushroom do not produce fruit-bodies in pure culture. Vegetative mycelia of mushrooms in pure culture have received little attention in mycological literature. Many species of mushrooms cannot be identified correctly without the study of vegetative mycelia. [Hawksworth, 2001]
- Some mushrooms are used in combination with other herbs for effectiveness in solving certain health challenges; the Identity of the other herbs is unknown as most local herbalist hoards this information to enhance their patronage (Hrudayanath and Sameer, 2014).
- The inability of people to distinguish between edible and poisonous mushroom has led to the non-exploitation of the mushroom species.
- It is not known whether the bioactive effects are caused by a single component or are the result of a synergistic impact of several ingredients.
- There is also insufficient data to determine which components have better effects those from mushroom fruiting bodies or from submerged mycelia powder versus extracts.
- There is also insufficient data to determine whether the use of hot water extract of dried fruiting bodies and mycelia powders is more effective or the use of alcohol or hydro-alcohol extracts (Hawksworth, 2001).

Also there is the issue of dosage and the duration of administration of mushroom in order to cure a particular ailment. Some research shows that too high a dose could lead to immune suppression and too low a dose might not trigger an immune response (Hawksworth, 2001).

- Erroneous identification of mushrooms with phenotypic characters. A combination of morphological and molecular identification based on gene sequence should be employed for correct identification (Jin et al., 2012).
- Also in some parts of the world most people do not consume mushroom as they perceive it to be food for the poor (Hrudayanath and Sameer, 2014).
- Seasonal nature of mushrooms has made them unavailable throughout the year, thus they cannot be exploited readily for their medicinal potential (Hawksworth, 2001).

II. CONCLUSION

Mushrooms have a lot of great medicinal potential and many scientific research and case studies in traditional medicine and nutritional studies have led emphasis on these potentials. There is need for proper sensitization and use of mushrooms in curing the many health challenges faced by people and the wholesome consumption

of them in our everyday diet as they serve as an immune booster. Also more study is needed to investigate the bioactive extract present in mushroom and the needed dosage vital for immune response, as this would go a long way to facilitate and promote proper management of chronic diseases.

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