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8**Ganoderma lucidum: Multitherapeutic values Mushroom**Somanath Nayak^{1*}, B.S. Nayak²¹RK College of Engineering and Technology, Niligirh, Balasore – 656039, Odisha, India.²Institute of Pharmacy & Technology, Salipur, Cuttack – 754202, Odisha, India.

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ABSTRACT: Traditionally, Mushrooms are considered as an important natural source of food and medicines. *Ganoderma lucidum*, (*Ganodermataceae*) an oriental fungus, has a long history of use for promoting health and longevity in China, Japan, Malasiya, Japan and other Asian countries. *G. lucidum* may be Reishi (Japanese) and Lingzhi (Chienese) type. Reishi mushroom has also been commonly referred to as the immortality or Ten thousand year or Spiritual potency or spirit plant mushroom. Various polysaccharides (i.e., β -D-glucans and glycoproteins) and triterpenoids are the major active constituents present in Ganoderma. Ganoderma is an Adaptogen and contains up to 400 different nutrients. Nutritionally *G. lucidum* provide folin-positive materia, glucose, protein and metals like K, Mg Ca, Se, Fe, Zn and Cu. *G. lucidum* therapeutically used for cancer, hypertension, Diabetes, Tumors, antiaging, Infections and Immunity disorder. Biologically, *G. lucidum* behaves as antioxidative, radical-scavenging effects, enhancement of host immune function, induction of cell-cycle arrest and apoptosis. A variety of commercial *G. lucidum* products are available in various forms, such as powders, dietary supplements, and tea. Globally with aid of ornamental, nutritional and therapeutic values, *G. lucidum* are cultivated in challenging manner with high economic and commercialize values.

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INTRODUCTIONS:

The mushrooms have both food and medicine as per World concern since for thousands of years. The literature says that globally, about 1.5 million species of fungi, but out of which only 82,000 species are described. Among all the species, 5,000 species are edible and only 2,000 species are safe. Ancient Chinese herbalists considered the Reishi mushroom the most beneficial of all medicines. As per Herbalist, Ethnobotanist, Scientist, Traditionally, Ganoderma is claimed to alleviate or cure virtually all diseases. The

Ganoderma species with medicinal purposes are *G. lucidum*, *G. luteum*, *G. atrum*, *G. applanatu*, *G. australe*, *G. capense*, *G. tropicum*, *G. tenue* and *G. sinense*. About 250 *Ganoderma* species have been described [1-3].



Fig 1. *Ganoderma lucidum* fungus.

In standard taxonomical description, *Ganoderma* usually refers to the species of *G. lucidum*. *G. lucidum*, is a basidiomycotina mushroom belonging to the family of *Ganodermaceae* of polyporales, which is widely used in oriental medicine for longevity and health promotion. It is commonly named as Lingzhi in china, Youngzhi in Korea, Reishi in Japan and *Ganoderma* in USA. *G. lucidum* is the annular mushroom grows in a wide variety of dead or dying trees like oak, maple, elm, willow, sweet gum, magnolia and locust. It is distributed geographically in Europe, Asia and North and South America. Chemical investigations on the fruiting bodies, spores and mycelia of *G. lucidum* reveal that they contain various bioactive substances which are responsible for exhibiting health benefits. This mushroom also added to the American Herbal Pharmacopoeia and Therapeutic compendium [3-6].



Fig 2. Lingzhi *Ganoderma* fungus.

HISTORY:

Over last 200 years, Lingzhi has been recognized as a medicinal mushroom. The proliferation of *G. lucidum* images in art began in 1400 AD. *G. lucidum* images appeared in paintings, carvings, furniture, and even women's accessories. The first book wholly devoted to the description of herbs and their medicinal value was Shen Nong Ben Cao Jing, written in the Eastern Han dynasty of China. In the Supplement to Classic of Materia Medica and the Ben Cao Gang Mu, this is considered to be the first pharmacopoeia in China. The mushroom was attributed with therapeutic properties, such as tonicifying effects, enhancing vital energy, strengthening cardiac function, increasing memory, and antiaging effects. According to the State Pharmacopoeia of the People's Republic of China, *G. lucidum* acts to replenish Qi, ease the mind, and relieve cough and asthma, and it is recommended for dizziness, insomnia, palpitation, and shortness of breath [7,8].

TAXONOMY:

Vietnam: Ling chi; Kingdom: Fungi; Phylum: Basidiomycota; Class: Agaricomycetes; Order: Polyporales; Family: Ganodermataceae; Genus: *Ganoderma* and Species: *lucidum* [9].

CULTIVATION:

The *Ganoderma* genus needs various nutritional conditions for growth and cultivation. The different species of *Ganoderma* are confined to different geographical regions. The *G. lucidum* artificially has been cultivated by using grain, sawdust, wood logs and cork residues.

For the growth of submerged mycelial culture, different growth parameters (e.g., temperature, pH) involved, which can be standardized under controlled conditions. The polysaccharide production by fermenter grown mycelia of *G. lucidum* was optimum at 30 to 35 °C and a pH of 4 to 4.5. The other additional supplements required for growth are essential fatty acids, which accelerate mycelial growth and the production of bioactive components [10,11].

MUSHROOM BIOCONSTITUENTS:

G. lucidum is a select plant that is loaded with a wide range of superior nutrition for the body cells. Some of the most important constituents are Polysaccharides (Beta D-Glucan, Betaglucan, Germanium), Anti-Oxidants (very high - around 23,000 I.U's.), Adenosine, Vitamins (C and B), Enzymes, Essential Fatty Acids,

Minerals (Se, Fe, Ca, Zn, Mg, Cu and K), Proteins, Glycoproteins, Triterpenes and Triterpenoids.

It contains Ganoderic acids, Ganodermediol, Ganoderiol F, Ganodosterone, Ganodermanontriol, Ganoderic acid B, Ganodermediol, Ganodelan A and B, Lanostan, Lucidiol, Lucidenic acid B, Applanoxidic acid G.

The plant Sterols present in this mushroom are Ergosterol, Alkaloids, Nucleotides, Lingzhi 8, Uridine, Urasil, Pantothenic acid, Canthaxanthin, lipids, protein, fibre, carbohydrates, volatile oil, Vit B2, Coumarin, Mannitol, Oleic acid, RNA, Cyclooctosulphur.

The mushroom is associated complex phytochemicals with including Ergosterol, Ergosteroids, Fumaric acid, Aminoglucose and Lactones [12-14].



Fig 3. Reishi Ganoderma fungus.

THERAPEUTIC VALUES [15-24]:

For healthy Heart:

The ganoderic acid of Ganoderma enhances blood flow and decrease oxygen consumption in the heart muscle. It also lowers cholesterol and inhibits platelet clumping, which often leads to heart attack.

Ganoderma prevents the buildup of plaque in the arteries. Literature suggesting that consuming ganoderma for 2 weeks can significantly lower blood pressure.

Anti-Allergic:

Various allergic conditions like asthma and dermatitis significantly inhibited by Ganoderma in clinical case of atopic shock, dermatitis, hay fever, hives, and food and drug allergies. This effect exhibited due to Triterpenes, as it inhibits histamine release.

This effect was supported by Polysaccharides, as it improves the ability of antibodies to fight bacteria and viruses that cause allergic reaction.

Hepatoprotective:

Ganoderma protects the liver from damage caused due to physical and biological factors. It also treats alcohol induced fatty liver and cirrhosis. It also helps patients suffering from hepatitis B and elevated liver enzymes. The antioxidants present in Ganoderma combats the free radicals, promoting liver regeneration.

Detoxification in the Body:

Ganoderma eliminates the toxins accumulated in the body due to excess intake of medicines and junk food. It promotes the efficient synthesis of bile and fatty acids, promoting faster detoxification of the chemicals from the body with aid of increased ability of in taking more than 1.5 times oxygen. Ganoderma rapidly oxygenates the body and adjusts its pH value.

Renal Diseases:

Kidney disease like chronic nephritis, diabetic renal syndrome and nephritis (Cause by due to high blood sugar and cholesterol levels) is cured by Ganoderma by lowering proteinuria and cholesteroemia. It occurs in the body.

Sleep booster:

Ganoderma is a sleep promoting herb as suggested by Chinese herbalists. Regular usage of Ganoderma can promote a slow wave of sleep.

Mental stabilizer:

Environmental stress can cause neuroses; can be treated by Ganoderma, as recommended by Japan. A study also found that regular intake Ganoderma can help patients suffering from Alzheimer's disease.

Muscle Relaxant:

Ganoderma is exhibiting muscle relaxing and pain inhibiting properties. The research proved that the Ganoderma can also treat anorexia.

Immune modulator and stabilizer:

Reishi mushrooms boost, stimulate and regulate immune system. It regulates metabolic balance and promotes a synthesis of nucleic acid in the body. Polysaccharides raise the levels of interferon in the body by promoting the release of protein from the white blood cells.

Anti-ageing:

The mechanism of nuclear DNA synthesis and increased cell division done by polysaccharides in ganoderma delaying the onset of ageing and enhance life span by managing the autoimmune and other neurodegenerative.

Weight Loss:

Ganoderma enable high content of oxygen, which burn fat, thus increases fat metabolism, leading to weight loss.

Antioxidants:

Ganoderma Lucidum peptide such as polysaccharide, polysaccharide peptide complex and phenolic components act as a strong antioxidants.

Cancer:

Ganoderma (Ganoderic acid) is a potent anticancer agent as it strengthens the immunity and combats cancer cell proliferation by stimulating the production of interleukin-2, which helps to fight several types of cancer, by stimulating the creation of protein in the bone marrow.

Infection:

Ganoderma stimulates the maturity of immune cells called macrophages, which digest infectious bacteria. This further prevents secondary and yeast infections.

Anti-stress:

Ganoderma reduces has stress, anxiety, depression and emotional outbursts during chronic stress.

Skin Health:

Topical application of Ganoderma can be very effective for healing skin wounds, eczema, psoriasis, bug bites, stings, and scrapes.

Urinary Tract Infection:

Ganoderma can also provide relief from urinary tract infections. In a study, 88 people suffering from urinary tract infection were given ganoderma for 2 weeks. The researchers found that ganoderma was significantly superior to placebo in providing relief from urinary tract infection. It inhibits 5- alpha reductase, an enzyme that converts testosterone to Dihydrotestosterone.

Anti-inflammation:

Ganoderma extract is very effective for decreasing post-herpetic pain, swelling due to rheumatoid arthritis and effective for stiff neck and arms.

Anti-diabetic:

Ganoderma provides hypoglycemic effect, as it contains polysaccharides (Ganoderans A, B and C). It elevates plasma insulin levels to enhance peripheral tissue utilization and liver metabolism of glucose.

Radiation:

Ganoderma augments the effects of radiation therapy while acting directly against tumors. It strengthens the

immune system, which helps the body to manage radiation therapy and chemotherapy. It also eases the symptoms of radiation therapy like nausea, vomiting, fever, infection, and hair fall and weight loss.

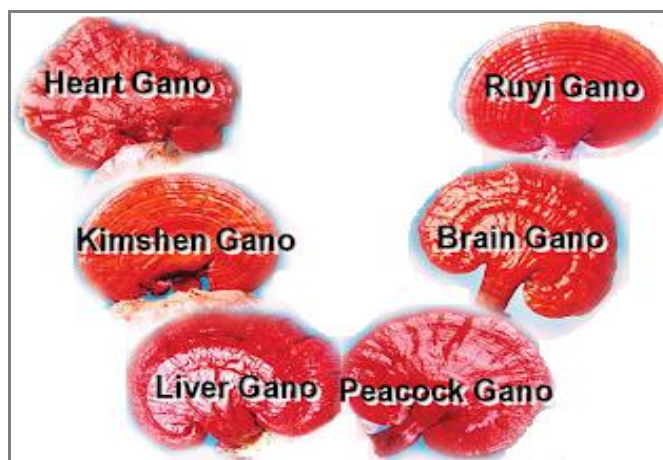


Fig 4. Six species of Ganoderma red mushroom used by DXN.

DOSAGE (DXN GANODERMA):

DXN Ganoderma uses six red mushrooms (Fig 4) for preparation various formulations like capsule, paste, lotion, tea and coffee forms (Fig 5). Natural products are safe at specified dose. Ganoderma in capsule and tincture form are available. It can be taken in tea and coffee form [25].



Fig 5. Various Ganoderma DXN Products.

CONCLUSION:

Global consumption of *G. lucidum* is high, and a large, increasing series of patented and commercially available products that incorporate *G. lucidum* as an active ingredient are available as food supplements. The Ganoderma extracts and isolated constituents in various formulations are marketed all over the world in the form of capsules, creams, hair tonics, and syrups. The popularity of *G. lucidum* for its therapeutic values like

antioxidant, antibacterial, and antiviral effects; and protection against liver and gastric injury. More research has to be done on human experiment clinically. More limiting factors for Ganoderma starting dosage to production quality. Still research needs more quality and standardization of Ganoderma.

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