

Cultivation, Utilization, and Medicinal Effects of *Ganoderma Lucidum* in Malaysia

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Abstract : In Malaysia, *Ganoderma lucidum* was initially cultivated in the 1980's. More recently, hybrid cultures of *G. lucidum* were used for mass production which only required 40 to 45 days of incubation. The basidiocarps are sliced and brewed as a tonic or as *Ganoderma* tea. They may also be powdered or extracted with solvent to yield the finished product which is then made into capsules. *Ganoderma* nutraceuticals are used as a remedy to treat more than 20 different illnesses which include migraine and headache, hypertension, arthritis, bronchitis, asthma, anorexia, gastritis, haemorrhoids, hypercholesterolaemia, nephritis, dysmenorrhoea, constipation, lupus erythematosus, hepatitis, leukopenia, cardiovascular problems and cancer including leukaemia.

Introduction

Ganoderma lucidum was acclaimed as a divine herb that could bestow longevity. It was also deemed as an elixir of life that it could augment good health and well-being. This might be the case when certain mushrooms were treated as objects of worship or as objects of mysteries describing them as celestial herbs possessing panaceal properties. Nowadays, modern research has revealed its active ingredients, which include polysaccharides, organic germanium, triterpenoids, adenosine, LZ-8, and an array of amino acids besides numerous mineral types.

Cultivation of *Ganoderma Lucidum* In Malaysia

Cultivation of *G. lucidum* in Malaysia was initially attempted by Teow in 1984¹⁾ using sawdust in polypropylene or polyethylene bags in sheds under palm oil trees. Subsequently, better hybrids were obtained through cross breeding which only required 40 to 45 days of incubation²⁾ for its cultivation. The annual production of the basidio-carps of *G. lucidum* in Malaysia is estimated to be around 300 tons but the production of mycelium is negligible.

Utilization of *Ganoderma Lucidum*

The basidiocarps are sliced and brewed and are taken as a tonic or *Ganoderma* tea. It may also be powdered or extracted with chemical solvent and the finished product is then processed into capsules.

Medicinal Effects of *Ganoderma Lucidum*

The beneficial medicinal effects of *G. lucidum* may be summarized as follows:

Effect on Hepatitis B

G. lucidum has been shown to be effective in the treatment of Hepatitis B resulting in the lowering of SGPT and SGOT levels to normal, and the sero-conversion of HB_s antigen to HB_s antibody³⁾. Extract of *G. lucidum* when administered concurrently with glutathione against liver damage by carbon tetrachloride, proved to be beneficial against hepatic necrosis and hepatitis⁴⁾. It was also discovered that extract of *G. lucidum* could probably augment the rate of toxin transformation and subsequent bile excretion, thereby acting as a liver detoxicant and protectant⁵⁾.

Effect on Diabetes

Extract of *G. lucidum* has also been found to be effective in reducing the blood glucose level after two months of treatment³⁾. Ganoderan B was considered to enhance glucose utilization because it increased the plasma insulin level in normal and glucose loaded mice, but did not affect the insulin binding to isolated adipocytes⁶⁾. The hypoglycaemic activity of *G. lucidum* is thus due to an increase of the plasma insulin level and an acceleration of glucose metabolism occurring not only in the peripheral tissues but also in the liver.

Effect on Hypertension

G. lucidum is also effective in lowering hypertensive blood pressure. This is due to the presence of lanostane derivatives especially ganoderic acids B, D, F, H, K, S and Y which exert their hypotensive activities⁷⁾.

Effect on Acute Myeloblastic Leukaemia

Acute myeloblastic leukaemic patients were treated with high doses of *G. lucidum* (6 capsules 3 times a day) prior to chemotherapy and continued for a period of three months. The chemotherapy regimen consisting of cytarabine and daunorubicin was given on a monthly basis in order to induce remission. CNS prophylaxis was given with cranial irradiation. All the patients had a subjective response when *G. lucidum* was included in their treatment regimen. Changes in their WBC, haemoglobin and platelet counts were either significant or very significant after 3 months of treatment. Despite the remission for the past 3 years, the long term prognosis seems encouraging.

Effect on Nasopharyngeal Carcinoma

Five patients with stage III nasopharyngeal carcinoma (NPC) were given 6 capsules of *G. lucidum* 3 times a day for 1 week before radio- and chemotherapy and continued for a course of 3 months while they were given a complete course of irradiation lasting for 6 weeks. The chemotherapy regimen consisting of cyclophosphamide, lomustine, daunorubicin and vincristine was administered every month for a period of 4 months. Objective response occurred in all the NPC patients with very significant tumour shrinkage after 40 days of treatment with *G. lucidum* in concurrence with radio- and chemotherapy. The tumours were completely regressed after 90 days of combined treatment and were in remission for the last three and a half years. It is conceivable that *G. lucidum* plays an adjuvant role in combination with radio- and chemotherapy, thereby rendering the complete regression of the tumours. Since both polysaccharides and organic germanium derived from *G. lucidum* are not cytotoxic to tumour cells, the antitumour effect is attributable to induced immunopotentiality. As an immunopotentiator, *G. lucidum* accelerates the production of interleukin-2 from helper T cells and potentiates the induction of different types of anti-tumour cells, such as NK cells and cytotoxic macrophages, in addition to the induction of interferon production. The patients felt more energetic, and had a better appetite and slept better. Nausea and vomiting were mild whereas stomatitis and sore throat were transient. Their pain was alleviated, and no other side effects were observed.

Effect on Wound Healing

Three patients with diabetic wounds were healed between 15 to 22 days. This might be due to the glucan from the cell walls of *G. lucidum* that could activate the fibroblast migration in order to achieve wound healing and tissue proliferation.

Considering all these effective findings, further research on *G. lucidum* as a potential nutraceutical for similar illnesses or other ailments seems warranted.

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