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Research Article

LITERATURE REVIEWED AND SELF CONDUCTED COMPARITIVE PHYTOCHEMICAL ANALYSIS OF POWDER OF *GANODERMA LUCIDUM* WITH METHANOLIC EXTRACT

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ABSTRACT

Ganoderma is a genus that belongs to polypore mushrooms which grow on wood, and include about 80 species, many from tropical regions. They are used extensively used in traditional Asian medicines for their potential use in bioremediation, and hence are very important genus economically. The objective of this study was to do phytochemical analysis of the *Ganoderma lucidum* powder and compare with literature study of methanolic extract. Phytochemical analysis of the test solution was done according to published methods. Earlier Phytochemical analysis of methanolic extracts of *Ganoderma lucidum* reveals the presence of alkaloids, flavanoids, carbohydrates, reducing sugars, tannins, phlobatannins cardiac glycosides, terpenoids, anthraquinones, saponins, volatile oils and steroids. In our study we have found the presence of carbohydrates, alkaloids, glycosides & lactones in *Ganoderma lucidum* powder. The other phytochemicals compared to methanolic extract done in earlier studies was not found in our study as we have not tried to do any extraction.

Keywords: Alkaloids, *Ganoderma lucidum*, Glycosides, Lactones, Phytochemicals, Methanolic extract.

INTRODUCTION

Ganoderma lucidum (Mushroom) (Fig. 1) in chinese term called as *lingzhi* is one of the healing medicinal agents of herbal base that has been used for over 4,000 years in Chinese Traditional Medicine (CTM) to treat wide range of illnesses including cancer¹. It grows like plant, but is without chlorophyll. They depend on other organisms or plants for their nutrition. Literature review reveals that mushrooms were first known to early Greeks and Romans who considered and classified them as edible, poisonous, and medicinal mushrooms^{2,3}. Names for the *lingzhi* fungus have a two thousand year history. The Chinese term *lingzhi* was first recorded in the Eastern Han Dynasty (25–220 CE). Petter Adolf Karsten named the genus *Ganoderma* in 1881⁴. *Ganoderma lucidum* is a polypore mushroom that is soft (when fresh), corky, and flat, with a conspicuous red-varnished, kidney-shaped cap and depending on the age of the specimen it has white to dull brown pores underneath⁵. *Ganoderma lucidum* generally occurs in two growth forms, one, found in North America, is sessile and rather large with only a small or no stalk, while the other is smaller and has a long, narrow stalk, and is found mainly in the tropics.

However, many growth forms exist that are intermediate to the two types, or even exhibit very unusual morphologies, raising the possibility that they are separate species. Environmental conditions also play a substantial role in the different morphological characteristics that *Ganoderma lucidum* can exhibit. For example, elevated carbon dioxide levels result in stem elongation in *Ganoderma lucidum*. Other forms show antlers, without a cap and these may be affected by carbon dioxide levels as well. The species can also be differentiated by their colors in which the red reishi is the most researched kind. The three main factors that are greatly influencing the shape it takes are light, temperature, and humidity (although less significant water and air quality can have an impact⁶).



Fig. 1: *Ganoderma lucidum*

Earlier Phytochemical analysis of methanolic extracts of *Ganoderma lucidum* reveals the presence of alkaloids, flavanoids, carbohydrates, reducing sugars, tannins, phlobatannins cardiac glycosides, terpenoids, anthraquinones, saponins, volatile oils and steroids⁷.

The objective of this study was to do phytochemical analysis of the *Ganoderma lucidum* powder and compare with literature study of methanolic extract.

MATERIALS AND METHODS

Crude Powder:

The powder *Ganoderma lucidum* was obtained by opening the capsule manufactured and marketed by Daesha Trading (India) Pvt. Ltd., No.1-A, First Floor, B-Block, Thiagaraya Road, T.Nagar, Chennai 600017, Tamil Nadu, India.

Chemicals:

All the chemicals required for phytochemical screening was procured from Rajesh chemicals, Mumbai.

PHYTOCHEMICALS ANALYSIS

Phytochemical analysis of the test solution was done according to published methods⁸⁻¹⁰.

TEST FOR PHYTOSTEROLS

Salkowski reaction: 0.5 ml sample in chloroform was taken in a test tube and 1ml of Conc.H₂SO₄ was added from the sides of the test tube. Appearance of reddish brown color in chloroform layer indicates presence of phytosterols.

TEST FOR TRITERPENOIDS

Tschugajeu test:

To the sample in chloroform, excess of acetyl chloride and a pinch of zinc chloride were added and kept aside for reaction to subside and then warmed on water bath. Appearance of eosin red colour indicates presence of triterpenoids.

TEST FOR SAPONINS

Foam test: A small amount of sample was taken in a test tube with little quantity of water and shaken vigorously. Appearance of foam persisting for 10 minutes indicates presence of saponins.

TEST FOR ALKALOIDS

Dragendroff's test: Sample was dissolved in chloroform. Evaporate chloroform and acidify the residue by adding few drops of Dragendroff's reagent (Potassium Bismuth Iodide). Appearance of orange red precipitate indicates the presence of alkaloids.

TEST FOR CARBOHYDRATES

Benedict's test: 5-8 drops of the sample was heated with Benedict's reagent in a test tube. Change in blue color varying from yellow to brick red indicates the presence of carbohydrates.

Molisch's test: Sample was mixed with Molisch's reagent and Conc. H₂SO₄ was added along the sides of the test tube to form layers. Appearance of reddish violet ring the interference indicates the presence of carbohydrates.

TEST FOR FLAVANOIDS

Ferric chloride test: To the alcoholic solution of the sample, drops of neutral ferric chloride solution were added. Appearance of green color indicates the presence of flavanoids.

TEST FOR LACTONES

Legal's test: To the sample, sodium nitroprusside and pyridine were added. Then the mixture is treated with NaOH. Appearance of deep red color indicates the presence of lactones.

TEST FOR PHENOLIC COMPOUNDS AND TANNINS

Ferric chloride test: To 2 ml of sample in a test tube, ferric chloride solution was added drop by drop. Appearance of bluish black precipitate indicates presence of phenolic compounds and tannins.

TEST FOR PROTEINS

Ninhydrin test: Few drops of Ninhydrin were added to the sample. Appearance of blue colour indicates presence of amino acid where as proteins may rarely give positive result.

TEST FOR GLYCOSIDES

Keller-Killiani test: To Sample, 1ml of glacial acetic acid plus few drops of ferric chloride solution + Conc. H₂SO₄ was added slowly through the sides of the test tube. Appearance of reddish brown ring at the junction of the liquids indicates the presence of de-oxysugars.

FIXED OILS AND FATTY ACID

Spot test: Prepared spot on the filter paper with the test solution and oil staining on the filter paper indicated the presence of fixed oil & fats.

RESULTS

The results are shown in **Table 1**.

Table 1: Showing Phytochemical Analysis of Powder of *Ganoderma lucidum*

TEST	<i>Ganoderma lucidum</i>
PHYTOSTEROLS Salkowski test	-
SAPONINS Foam test	-
TRITERPENOIDS Tschugajeu test	-
CARBOHYDRATES Benedict's & Molisch's test	+
ALKALOIDS Dragendroff's test	+
LACTONES Legal's test	+
GLYCOSIDES & Keller-Killiani test	+
TEST FOR FLAVINOIDS, PHENOLIC & TANNINS Ferric chloride	-
PROTEINS Ninhydrin test	-
FIXED OILS AND FATTY ACID Spot test	-

DISCUSSION

Bioactive compounds found in mushroom are known to play a vital role in promoting health. The presence of essential nutrients and minerals in the wild mushroom imply they could

be utilised to improve poultry production and health¹¹. The medicinal benefits of wild *Ganoderma lucidum* harvested from Vom in Plateau State, Nigeria was reported earlier.¹²⁻¹⁶ Earlier Phytochemical analysis of methanolic extracts of *Ganoderma lucidum* reveals the presence of alkaloids, flavanoids, carbohydrates, reducing sugars, tannins, phlobatannins cardiac glycosides, terpenoids, anthraquinones, saponins, volatile oils and steroids¹⁷.

In our study we have found the presence of carbohydrates, alkaloids, glycosides and lactones in *Ganoderma lucidum* powder. The other phytochemicals compared to methanolic extract done in earlier studies was not found in our study as we have not tried to do any extraction. This shows that extraction procedure may help to reveal more compounds than crude powder of the sample in question especially for herbal and related compounds.

CONCLUSION

We conclude that this mushroom has to be subjected to extraction with other different solvents and analyze its phytochemicals. We also opine that further studies are required to study its comprehensive analysis including quantitative / semi quantitative analysis, characterize its chemical structure and assess its biological activities.

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