

Study the Chemical Components and the Antibacterial Activity of Different Extract of *Lasia spinosa* (L): A Review

Manabendra Borah

Molecular Biology and Bioinformatics, Tripura University 799022

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ABSTRACT

In the present review, an attempt has been made to put together all antibacterial studies done on commonly available important medical plant ***Lasia spinosa* (L)**. ***Lasia spinosa* (L)** is an Araceae family plant found widely in aquatic and semi aquatic places. Medicinally important phytochemicals like- Alkaloids, Flavonoids, Tannins, Saponins, Steroids, Terpenoids, and Phenols etc were extracted from different parts of the plant bodies. ***Lasia spinosa*** reported to possess antibacterial and antimicrobial activities. This review encompasses the potential activities of the ***Lasia spinosa*** plant against human pathogenic bacteria and their range of capabilities. Distribution and habitat of the plant and nature of the some chemical components are also reviewed.

Keyword: *Lasia spinosa*, medicinal plant, Phytochemicals, antibacterial activities.

I. INTRODUCTION

Naturally available many unknown plants have many significant properties due to large source of therapeutic phytochemical that may lead to development of novel drugs. Different type antioxidants are found in natural plant including phenolic, carotenoids, anthocyanins and tocopherols etc. About 20% of known plants have been used in pharmaceutical studies and research, impacting the healthcare system in positive ways. Among these *Lasia spinosa* (L) Thwaites is specific type of plant on which few studies done. *Lasia*

spinosa (L) Thwaites is an angiosperm (flowering seed plants), shrub with perennial, and semi aquatic hydrophytes. *Lasia spinosa* (L) Thwaites is an autotrophic plant which maximum plant body height is 1.5m. Evergreen foliage is alternate long and spiky-stalked leaves have broad leaf. Unisexual Flowers are mainly yellow or brown up to 4 cm long. A rough surfaced fruits are borne on the axis of inflorescence. *Lasia spinosa* (L) grows along tidal rivers, and in open wet places, and swamp forests. Containing rich nutrient watering logged soils are suitable for its plant grow. *Lasia spinosa* (L) Thwaites is a large herbaceous plant that belongs to the family Araceae which consists of approximately 115 genera and 16 species. The *Lasia spinosa* (L) plant is a marshy plant with a creeping, spiny rhizome that can grow up to 2 m tall; leaves arise from the base and are arranged like a rosette. Each leaf is divided into several lobes and numerous small arms called the leaf stalk along the veins found at the back of leaves.^{[9][10]}

Taxonomical Classification

According to Indian Taxonomy Portal- IBP
Botanical Name: *Lasia spinosa* (L) Thwaites
Kingdom: Plantae
Phylum: Liliopsida
Order: Alismatales
Family: Araceae
Genus: *Lasia*
Species: *Lasia spinosa* (L)



Figure 1: Herbarium sheet of *Lasia spinosa* (L)

Habitat and Distribution

Lasia spinosa (L) is commonly known as Kohila or Unicorn plant. Local names of *Lasia spinosa* (L) Thwaites are Chengmora in Assam, Kata Kachu in Bangali area, Janum-saru in Manipur, Kohila/Mahakohila in Srilanka, Zawangzang in Mizoram and Laksmna in Sanskrit India.^[10] *Lasia spinosa* (L) Thwaites is mainly distributed in India, Sri Lanka, Bhutan, Bangladesh, China, Myanmar, Taiwan, Vietnam, Laos, Thailand, Cambodia, Malaysia, Indonesia and Papua New Guinea.^[2]

Objective

In this study we tried to characterize the major chemical constituents and potential activities of plant *Lasia spinosa* (L) Thwaites extracts against human pathogenic bacteria. Main objective of our investigation includes:

1. To characterize the major chemical compounds present in different parts of the plant *Lasia spinosa*.
2. Highlighting the antibacterial potential of different extract of the plant *Lasia spinosa*.

Chemical composition of *Lasia spinosa* Plant.

In preliminary phytochemical screening of *Lasia spinosa* has found presence of chemical compounds Alkaloids, Flavonoids, Tannins, Saponins, Terpenoids, and Phenol^[3].

Volatile compounds and Fatty acids reported to be present in different extracts of *Lasia spinosa* plant.

The major volatile compounds and fatty acid were methyl ester of oleic acid (49.98), palmitic acid (26.71) and stearic acid (10.15). These are- β -Elemene, Lauric acid, methyl ester, Myristic acid, methyl ester, 13-methyltetradec-9-enoic acid, methyl ester, Pentadecanoic acid, methyl ester, Hexahydrofarneyl acetone, Palmitoleic, methyl ester, Palmitic acid, methyl ester, 10-Heptadecenoic acid, methyl ester, Margaric acid, methyl ester, Methyl octadec-6,9-dien-12-ynoate, Linoleic acid, butyl ester, Palmitic acid, butyl ester, Cyclopropane octanoic acid, 2-octyl-methyl ester, 10-Nonadecenoic acid, methyl ester, Epoxyoleic acid, 10,13-Eicosadienoic acid, methyl ester, 11-Eicosenoic acid, methyl ester,

Arachidic acid, methyl ester, Octadecanoic acid, 5-hydroxy- δ -lactone, Heneicosanoic acid, methyl ester, Heptacosane, 13-Docosenoic acid, methyl ester, α -Glycerol linolenate, Behenic acid, methyl ester, Squalene, Cerotic acid methyl ester, Hexatriacontane, Crinosterol, Campesterol, Sigmasterol, Y-Sitosterol, Spinasterone.^[12]

There are also some chemical constituents which are abundantly found in *Lasia spinosa* (L). These are- β -sitosterol acetate, Stigmasterol, Acetate.^[6]

Chemical compounds presence in Leaves.

Different Phyto-components found in *Lasia spinosa* Leaves. Screening of different solvent extracts has revealed presence of Alkaloids in Methanol and Aqueous extract, Carbohydrate mainly found in Chloroform, Ethyl acetate, Methanol and Aqueous extract, Fats and oil found in Petroleum ether extract, Glycoside present in Petroleum ether, Chloroform, Ethyl acetate and Aqueous extract, Proteins in Ethyl acetate and Methanol extract, Tannins and Phenolic compounds are in Chloroform, ethyl acetate, Methanol and Aqueous extract.^[9]

Chemical compounds presence in Stem.

Different phytochemicals were reported to be present in stem portion of *Lasia spinosa*. The major phytochemicals include – Alkaloids, Carbohydrate, Flavonoids, Saponin, and Starch.^[4]

Stem of this plant also reported to be rich in Carotenoids.

Carotenoids act as an antioxidant component in human body (Szalay Jessie-Live Science Contributor, October 15, 2015). According to Physicians Committee for Responsible Medicine carotenoids have strong anti-cancer properties. In *Lasia spinosa* stems, there are found many carotenoids compounds like- α – carotene, β – carotene, β – carotene 5,6,5',6' diepoxide, 5,6,5',6'-diepoxo-5,8,5',8'-tetrahydro- β , β – carotene-3,3'-diol, Cis-neoxanthin.^[11]

Chemical compounds presence in Rhizome:

Chemical compounds found in rhizome are- Carbohydrate, Tannins, Glycosides, Phenolic, Phytosterol.^[5]

Phenolic content analysis:

Analysis of chloroform extract and Ethyl acetate extract of the medicinal plant *Lasia spinosa* has revealed the presence of different phenolic compounds. 4-Hydroxy benzoic acid, Morin, Cinnamic acid Apigenin are present in chloroform

extract of *Lasia spinosa* and in Ethyl acetate extract of *Lasia spinosa* present Gentistic acid, 4-Hydroxy benzoic acid, Morin, Syringic acids like phenolic compounds. The identified phenolic compounds in extracts are belonging to two classes of compounds i.e Phenolic acids and Flavonoids. Phenolic acids are further categorized into two categories one is derivatives of benzoic acids and another is derivatives of cinnamic acids. Derivatives of benzoic acid contain 4-Hydroxy benzoic acid, Syringic acid and Gentistic acid. Derivatives of cinnamic acids contain only Cinnamic acids. Two flavonoid compounds are found in plant *Lasia spinosa* (L). These are- Morin and Apigenin.^[12]

Antibacterial Activity of Different *Lasia spinosa* Extracts:

Essential oil and different extracts of *L. spinosa* showed efficacy against five human major pathogens.^[12]

These five human major pathogens are- Escherichia coli ATCC 35218 (EC) Methicillin-resistant Staphylococcus aureus (MRSA),

Klebsiella pneumoniae ATCC 700603 (KP)

Pseudomonas aeruginosa ATCC 27853 (PA)

Enterococcus faecalis ATCC 291212 (EF)

Essential Oil extract of *L. spinosa* showed strong efficacy against Escherichia coli, Methicillin-resistant Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas aeruginosa pathogens bacteria and showed mild or moderate activities against Enterococcus faecalis pathogens bacteria.

Ethyl acetate extracts of *L. spinosa* showed strong efficacy against all five major pathogens bacteria.

Hexane extracts of *L. spinosa* showed strong efficacy only against Pseudomonas aeruginosa and showed mild efficacy against Enterococcus faecalis, Klebsiella pneumoniae, Methicillin-resistant Staphylococcus aureus, and Escherichia coli.

Methanol extract showed only weak efficacy against Pseudomonas aeruginosa, and Methicillin-resistant Staphylococcus aureus pathogen bacteria but ineffective against the rest.

Chloroform extract of *L. spinosa* showed mild efficacy against Enterococcus faecalis, Klebsiella pneumoniae, Methicillin-resistant Staphylococcus aureus, Escherichia coli and showed weak efficacy against Pseudomonas aeruginosa pathogen bacteria.

Few studies reported that petroleum ether, ethyl acetate and methanolic extracts of rhizome

have been shown moderate activity against *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus* and *Vibrio parahemolyticus*.^[8]

Petroleum ether extract of *Lasia spinosa* (L) Thwaites has mild inhibitory activity against *Shigella dysenteriae* (Gram -) and *Candida albicans* (fungi). Dichloromethane extract has mild Inhibitory activity against *Candida albicans* (fungi), *Aspergillus niger* (fungi) and Ethyl acetate extract has mild activity against *Candida albicans* (fungi).^[7]

Another report state that Petroleum ether, Methanolic crude extract and Ethyl acetate extract showed Anti-microbial and Anti-Bacterial activity against some bacteria and fungi like- *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus niger*, *Salmonella enterica*, *Serovar paratyphi*, *Vibro mimicus*, *Vibrio parahemolyticus*.^[1]

Petroleum ether Extract showed Moderate activity against microbial profile like- *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus niger* and showed significant activity against *Salmonella enterica*, *Serovar paratyphi*, *Vibro mimicus*.

Methanolic crude Extract showed Moderate activity against *Bacillus cereus*, *Staphylococcus aureus*, *Vibro parahemolyticus*, *Escherichia coli* and showed significant activity against *Salmonella enterica*, *Serovar paratyphi*, *Vibro mimicus*.

Ethyl acetate Extract showed Moderate activity against *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus niger*, *Vibro parahemolyticus*, *Salmonella enterica*, *Serovar paratyphi*, *Vibro mimicus*.

II. CONCLUSION

The present study highlighted the importance of phytochemicals, chemical components, and antibacterial activities of the plant *Lasia spinosa* (L). This study indicate that *Lasia spinosa* (L) is a biologically active plant. It is reported to possess Antibacterial and anti-biofilm activities against range of bacterial species. The chemical composition of this plant has been experimentally established and an attempt was made to gathering all chemical constituents of different plant body parts. Characterization of the pharmacological properties and chemical constituents of this medicinally important plant can be useful for development effective therapeutic strategies against infectious diseases. Although,

further research is need to identify and characterize the active constituents which are responsible for biological activity of this plant.

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