A REVIEW ON HERBAL MEDICINAL PLANT: ALPINIA GALANGA L. WILLD

Bhosale Supriya1, Jadhav Abhishek2, Jamadar Aman3

*1,2,3 JBVP'S Vidya Niketan College Of Pharmacy, Lakhewadi, Pune, Maharashtra, India.
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ABSTRACT

India is very well known for medicinal plant used for treatment of various diseases. Green Plant represent big source of bioactive Compound. Alpinia galanga (Linn) of Zingiberaceae family is one of medicinally important plant. Country like Indonesia, Malaysia cultivate this plant. Botanically distributed name of these Plant consist of kulanjan, pera-rattai, arattha, etc. Morphological character of Alpinia galanga including Leaf apex, Leaf base Rhizome, Root, Fruit & seeds. The species of Alpinia galanga occurs naturally in Shady and marshy land and mostly cultivated in South & North India. T.S of Root and T.S of Rhizome show the microscopic character of A054alpinia galanga. Active Compound such as 1,8- Cineol, 1 '-acetoxy chavicol acetate, p-hydroxy cinnamaldehyde,1'S-1'-acetoxychavicol acetate from the Alpinia galanga plant. This plant can also be used as a treatment for various diseases like Antinflammatory, Antioxidant, Antimicrobial, Antiulcer, Antiemetic, Antidiabetic. The seeds are used as cardiotonic, hypotonic. The extract of rhizome is used as stomachic & camminative. The tubers of this plant is used as bronchitis, fever and diabetes mellitus.

Keywords: Alpinia Galangal, Zingiberaceae, Phenylpropanoid, Pediatric, Selerenchmatous.

I. INTRODUCTION

The use of herbal medicines has increased significantly in the last few years. Herbal products are now the hottest products in many countries due to their natural benefits and rare side effects. [1,2] Despite the dangerous content of current treatments, many serious diseases, many vaccines, autoimmune diseases and degenerative diseases, research is progressing. [3,4] Approximately 1.1 billion people in India (about 34% of the total population) continue to trust and believe in traditional systems of medicine. [5] According to the World Health Organization (WHO), approximately 80% of the world's population relies on some form of traditional medicine (mostly herbal products) for pain management. [6]

Greater galanga and 'Kulanjan' are other names for Alpinia galanga in English and Hindi, independently. Alpinia galanga is used in several southern Indian regions where croaker prefer Ayurveda and Siddha drug for treating a variety of ails, including diabetes. [7,8] Alpinia galanga crop dates are set at 3- month intervals between 6 and 48 months after planting in Kerala, India. The optimal strategy to achieve maximum affair for rhizome (45.4 t/ ha) and oil painting oil (127.4 liters/ ha) yields, as well as for getting oil painting oil of good quality (27.1 cineole(eucalyptol)), is to gather for 42 months following colony. [9] After 39 months of colony, a respectable quantum of oil painting (127.4 liters/ ha) was attained from the roots (19.5 t/ ha). Shoot yield (40.5 t/ ha) At 18 months following planted, the maximum shoot oil painting yield (70.61 h/ a) and yield(ha) were reached. [10] In the experimental setting, A. galanga grew to a maximum height of 129.4 cm, with further than 48 farmers per clump and 13 leaves per cultivator. [11] It is the imperishable condiment with lovely leafage and a raceme of brilliant blooms. Small in size, the rhizome has a pungent flavor and off- putting aroma. This condiment is constantly used in cuisine as a seasoning and as a seasoning. It's also used to make drugs, also it gives ginger a strong flavour. The lesser galangal, or Alpinia galanga(L.) Wild., is imperishable condiment that grows in Indonesia, Malaysia, and is also cultivated in Bengal and in some regions of south India. The green rhizomes contain essential canvases similar methyl cinnamate and cineole, which give them a strong flavor akin to pepper and gusto. Pediatric respiratory issues are treated with these green rhizomes. These are also employed as stomachics and carminatives. The light galangal is the occupant of the Eastern Archipelago, which is located off the Coromandel Coast in southeast India. [12]
Table No. 1

<table>
<thead>
<tr>
<th>Taxonomy</th>
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<tbody>
<tr>
<td><strong>KINGDOM</strong></td>
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<td><strong>GENUS</strong></td>
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<td><strong>SPECIES</strong></td>
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Table No. 2

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<th>Botanical Distribution of Name -</th>
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<tr>
<td>Hindi</td>
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<td>Kannada</td>
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<td>Bengali</td>
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<td>Gujrati</td>
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<td>Malyalam</td>
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<td>Tamil</td>
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<td>Telugu</td>
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<td>Marathi</td>
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II. GEOGRAPHIC DISTRIBUTION

Numerous Asian nations, including India, Arabia, China, Sri Lanka, and Indonesia, are home to Alpinia galanga plantations. Although it can also thrive in bushes, woodlands, and open areas, it prefers hot, sunny locations. Galangal plants are shipped from India to the Western Ghats and the Himalayas.

DETAILS OF THE PLANT

Alpinia galanga is herb with underground rhizomes and small adventitious roots that can reach a height of 3.5 cms. The surface of the rhizomes is reddish-brown, while the interior is brown and orange. They range in length from 2.5 to 10 cm, with an upright, leaf-covered pseudo-stem. The leaves are oblong-lanceolate, glabrous, distichous, and acute, ranging in size from 3.8 to 11.5 cm. Flowers are complex, 3–4 long, fragrant, and have white buds and green flower crowns at the base. The fruit is 1.5 cm in diameter, ellipsoidal and capsule-shaped, and orange to crimson in hue. The 2n chromosomal number for galangal is 48.

Morphology

Greater galangal is the popular name for Alpinia galanga. Its roots are tuberous and have a mild scent. Its roots are tuberous and have a mild scent. Oblong-lanceolate, sharp, glabrous, and green on top, Paler underneath, with marginally calloused white sheaths. Ligules are short and rounded, and scales are long and glabrous. 30 cm Panicles with densely flowered, greenish-white flowers; ovate-lanceolate bracts. Tubular and irregularly 3-toothed calyx, oblong corolla lobes, green claw, white blade, striated reddish red, slightly longer than 1 cm, generally oval, and quickly. Having two subulate glands at the base and two lobes at the tip having two subulate glands near the base of the claw's apex. Orange red fruit around the size of a small cherry.
Plant Morphological characteristics of A. galanga. a) Clump, b) Leaves, c) Ligule, d) Upper leaf surface, e) Leaf apex, f) Leaf base, g & h) Inflorescences, i & j) Flowers, k & l) Rhizomes, m) Labelum, n) Dorsal and side lobes, o) Infructescence, p) Fruits, and q) seeds

Cultivation

The colourful scientific exploration grounded on Alpinia galanga, this factory has a huge natural eventuality. Alpinia galanga is a common herbal factory, is extensively used as a treatment for colourful conditions, and has a different pharmacological diapason. Several chemicals are present in the factory which show wide pharmacological and medicinal properties. More exploration and evaluation needs to be done to insulate and identify different chemicals present in the factory which used for the mortal weal and their future.

Microscopy of Alpinia galanga

T.S. Root: The epidermis has a circular outline, is single-layered, cuticularized, oval, parenchymatous, tightly packed, devoid of intercellular gaps, and has stomata. Its dimension is approximately 38 × 20 m. The cortex has many layers, oval, parenchymatous, thin-walled cells, and intercellular gaps that are just 90 × 50 micrometers in size. There are oil cells with thick walls. Endodermis is composed of a single layer of barrel-shaped, non-intercellular gaps that are approximately 100 × 40 m in size. The radial and tangential inner walls are
thickened. Indistinct and parenchymatous, the pericycle gives rise to lateral roots. Xylem and phloem are the components of vascular tissue. Radial and polyarch vascular bundles exist. In contrast to the phloem strands, the xylem produces distinct strands. The xylem and phloem are surrounded by and in between the parenchymatous conjunctive tissue. 14 strands make up the xylem. Exarch of Xylem. Radial rows of circularly shaped vessels. Size of the metaxylem is approximately 88 x 70 m. Protoxylem with dimensions of approximately 44 × 28 m. Small, homogenous, parenchymatous, thin-walled cells make up the pith, which has cells that are isodiametric and measure about 36 × 40 m in size.

![Diagram of Root Structure]

**Fig No. 3 T.S. of Root**

T.S. Rhizome: Circularize your outline a little. Circularized, single-layered epidermis. Parenchymatous cells having thin walls that are rectangular in shape, tightly packed without intercellular spaces, and roughly 14 × 12 m in size. Walls outside are significantly thickened. About 55 × 76 m in size, the cortex is multi-layered, with homogeneous, circular, thin-walled, parenchymatous cells and little intercellular gaps. The cortex has some cells with crimson inclusions. Granular translucent inclusions can also be found in some parenchyma cells. Numerous scattered vascular bundles are the cortex's most distinguishing property. Each vascular bundle is closed-type, conjoint, and collateral. Phloem components have thin walls and are roughly 14 × 10 m in size. A sclerenchymatous bundle sheath encircles each vascular bundle. A bundle sheath has three to four layers. Secondary vascular bundles include cortical bundles. The endodermis is a confined area of cells with thin walls. The cortex and inner ground tissue are divided by it. The middle section is made up of ground tissue. It is made up of oval, thin-walled parenchyma cells that are around 56 × 36 mm in size. Numerous vascular bundles are dispersed throughout ground tissue. Vascular bundles are closer together and resemble a ring just beneath the endodermis just below the endodermis. These bundles are cortical bundles that are conjoint collateral as well. Phloem components are less significant than cortical ones.

![Diagram of Rhizome Structure]

**Fig No. 4 T.S. Rhizome**
Active substances

The most significant chemical from Alpinia galanga with several biological roles has been found and is called 1'S-1'-'acetoxycchavicol acetate (ACE). About 80% of the B-Hexosaminidase release, a marker of antigen-IgE-mediated degranulation in RBL-2H3 cells, was shown to be suppressed in the Alpinia galanga rhizome aqueous acetone extract. There are nine known phenylpropanoids. P-hydroxybenzaldehyde was isolated from the extract. 1'S-1'-'acetoxycchavicol and 1'S-1'-'acetoxyeugenol showed IC50 values of 15 and 19 mM14, respectively, among the acetates, showing substantial inhibitory effect.

Traditional Uses of Alpinia Galanga

Alpinia galanga, known as galangal, hails from Southeast Asia and plays a dual role in traditional practices – as a culinary delight and a medicinal treasure. This fragrant and zesty herb shares botanical ties with ginger and turmeric. Its applications are diverse:

1. Culinary Marvel
Flavourful Essence: Galangal graces the kitchens of Malaysia, Indonesia, and Thailand, lending its unique, lemony, and spicy touch to dishes like marinades, soups, curries, and stir-fries. Spice Enchantment: Thai curry paste and Indonesian rendang rely on galangal’s essence as a fundamental component. Preservation Gem: Galangal finds purpose in crafting pickles and preserves.

2. Traditional Healing
Digestive Companion: Galangal, in traditional herbal wisdom, aids in digestive comfort, soothing indigestion, and gas-related discomfort. Anti-Inflammatory Elixir: With its potential anti-inflammatory properties, it has historically offered relief from arthritis and inflammatory conditions. It’s also been a trusted remedy for motion sickness and nausea in various cultures. Respiratory Support: Galangal may be applied to address coughs, colds, and respiratory infections. In certain traditions, it’s even considered an aphrodisiac.

3. Rituals and Beliefs
Galangal transcends the realm of taste and health, making appearances as a gift in religious and spiritual ceremonies. Its protective aura leads to its use as an amulet or talisman.

4. Topical Comfort
Traditional medicine employs galangal paste or oil to alleviate pain and soothe joint and muscle discomfort.

5. Natural Preservation
Galangal’s natural antibacterial properties grant it a role as a food preservative.

6. Fragrance and Beauty
Its captivating scent places it in the realms of cosmetics and fragrances, enhancing the allure of various beauty products. While galangal boasts a rich history, ongoing research continues to unveil its potential health benefits. As with any powerful herb, it is advisable to seek professional guidance when considering galangal for therapeutic uses, especially since some of its traditional applications might lack full scientific support. Due to its potency, it should be used judiciously in culinary preparations.

III. PHYTOCHEMISTRY OF GALANGAL

Alpinine, Kaempferide, Methyl Cinnamate, Camphor, Pinene, Galangin, and Pineol are the compounds found in the Galangal Rhizome. P-methane-1,8-epoxy-acetoxychavicol acetate, 3-dioxo-4-methoxy flavone, (1'S)Acetates of 1-acetoxyeugenol, 1-acetoxyeugenol, and (1'S)Chavicol, 1'-acetoxychavicol acetate, 1'-acetoxychavicol acetate, (1R, 3S, 4S) D-camphor-trans-3-hydroxy-1,(R, 2R, 4S) 8-cineole-D-glucopyranoside 8-cineole-D-glucopyranosides, 1,8-cineole, 3-hydroxy-1, 8-cineole glucopyranosides, (4R, 1S, 2S) Trans-2-hydroxy-1, trans-p-coumarylidacetate, trans coniferylidacetate, di-(p-hydroxy-cisstyril) methane, trans -faranesene, 1-hydroxychavicol acetate, 4-hydroxybenzyldehyde, 7-hydroxy-cytidil) 3-dethethoxy flavone, p-hydroxycinnamaldehyde, ka Alpinia galanga yielded two diterpens known as galangal A and B, two labdane diterpens known as galanolactone and (E) - (17), 12-labdien-15,16-dial, and then (E)-(17)- epoxylabd-12-ene 15,16-dial. The galangal rhizome’s fragrant component is 1-'acetoxycchavicol acetate. [20] Table 3 lists the biomolecules discovered in Alpinia galanga ica and their mode of action.
## Table No. 3

<table>
<thead>
<tr>
<th>Name of compound</th>
<th>Type of the compound</th>
<th>Pharmacological activity</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) (BHPHTO) 1,7-bis(4-hydroxyphenyl)-1,4,6-heptatrien-3-one and (BDMC) bisdemethoxycurcumin</td>
<td>Curcuminoid (Natural phenols)</td>
<td>When checking for cell viability, it can prevent human A2058 melanoma</td>
<td>[21]</td>
</tr>
<tr>
<td>2) 1’-acetoxychavicol acetate</td>
<td>Phenylproanoid</td>
<td>ACA triggers apoptosis in myeloid leukemia cells. When ACA causes apoptosis in NB4 cells, caspase-9 is activated and mitochondrial transmembrane potential is restored; as a result, monitoring mitochondrial oxygen pressure facilitates ACA-induced blood signaling. However, ACA activates apoptosis with activated activity caspase-8 that is caused by fas.</td>
<td>[22]</td>
</tr>
<tr>
<td>3) 1’S-1’-acetoxyeugenol acetate</td>
<td>Phenylproanoid</td>
<td>It plays a significant part in the RBL-2H3 cells' ultimate phase I type allergic response.</td>
<td>[23]</td>
</tr>
<tr>
<td>4) p-hydroxycinnamaldehyde</td>
<td>Phenylproanoid</td>
<td>It has a chondrocyte effect that can be used as a potential therapy in the treatment of osteoarthritis.</td>
<td>[24]</td>
</tr>
<tr>
<td>5) 1’S-1’-acetoxychavicol acetate</td>
<td>Phenylproanoid</td>
<td>Because of how it inhibits the efflux pump, it has the potential to be a treatment for TB and is crucial in the fight against mycobacterium bacterial resistance.</td>
<td>[25]</td>
</tr>
<tr>
<td>6) 1’S-1’-acetoxychavicol acetate (ACA)</td>
<td>Phenylproanoid</td>
<td>It is crucial in preventing NF-B from being activated.</td>
<td>[26]</td>
</tr>
<tr>
<td>7) 1’S-1’-acetoxychavicol acetate (ACA)</td>
<td>Phenylproanoid</td>
<td>It functions as an antiplasmid against bacteria that are multi-drug resistant, or resistant to a variety of antibiotics.</td>
<td>[27]</td>
</tr>
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### PHENOLIC COMPOUNDS

Through the metabolism of shikimate, phenolic chemicals are created, which are phenylproanoids. These substances are byproducts of the secondary metabolism of galangal plants.\(^{[29]}\) Distributions, molecular weights, and complexity of phenolic compounds vary. One OH-bound group containing aromatic arene (phenyl) rings is present in all phenolic compounds.\(^{[28]}\) Phenolic substances are frequently thought of as weak acids since they have aromatic rings that give them the activity of phenolic hydroxyl groups. According to the number and makeup of carbon atoms in the molecules as well as their chemical diversity, these compounds can also be categorized.\(^{[30]}\) Flavonoids, phenolic acids, stilbenes, and lignins are the four classes into which phenolic compounds are divided based on the content and quantity of carbon atoms. While phenolic acids are categorized as derivatives of hydroxybenzoic acid and hydroxycinamic acid, flavonoids are classified as
Pharmacological Activity

It has a long history of operation in a variety of cookeries as well as in conventional medical practices including Ayurveda and traditional Chinese drug. Although not all of Alpinia galanga's pharmacological exertion and possible health benefits have been completely delved in clinical studies, it possesses a wide variety of them. The following are some of the pharmacological goods and operations of Alpinia galanga:

1. Anti-Inflammatory - The bioactive substances in Alpinia galanga have anti-inflammatory goods. It has been used for a long time to treat ails like arthritis and lessen pain by reducing inflammation.

2. Antioxidant - The factory has antioxidants that aid in defending cells against oxidative stress and detriment brought on by free revolutionaries. Its general health advantages might be attributed to these antioxidants.

3. Antimicrobial - Alpinia galanga has shown antimicrobial action against a range of pathogens, similar as bacteria, fungus, and contagions. It has a long history of operation as an antibacterial agent and as an infection remedy.

4. Antiulcer - According to certain exploration, Alpinia galanga excerpts may have antiulcer rates that might help shield the stomach filling from detriment brought on by gastric ulcers.

5. Anticancer - Early studies suggest that Alpinia galanga may retain implicit anticancer goods. Its bioactive substances have looked at to see whether they can stop the development of cancer cells. - diabetic Alpinia galanga excerpts have demonstrated implicit in lowering blood sugar situations and enhancing insulin perceptivity, making them a content of study for the remedy of diabetes.

7. Antispasmodic - It has been used for ages to treat muscle spasms and gastrointestinal discomfort. Its antispasmodic properties might be attributed to its constituent compounds.

8. Antiemetic - Repelling Alpinia galanga is a useful treatment for morning sickness and stir sickness during pregnancy because it effectively lowers nausea and vomiting.

9. Digestive Health - It's said to prop in digestion and lessen issues like indigestion and gas.

10. Neuroprotective - According to certain exploration, Alpinia galanga may have neuroprotective parcels that may help to forfend against neurodegenerative ails.

11. Antiemetic - Alpinia galanga may help lower blood pressure and cholesterol situations, supporting cardiovascular health, according to some data.

12. Wound Healing - Alpinia galanga has been applied topically in traditional drug to promote crack mending and cure skin diseases.

While Alpinia galanga has pledge in a number of pharmacological conditioning, it's pivotal to punctuate that farther study, including clinical trials, is needed to fully comprehend its mechanisms of action and remedial eventuality. also, if you have any beginning medical enterprises or are taking drug, you should only use Alpinia galanga under the supervision of a healthcare provider.

IV. CONCLUSION

From the various scientific research based on Alpinia galanga, this plant has a huge biological potential. Alpinia galanga is a common herbal plant, is widely used as a treatment for various diseases, and has a diverse pharmacological spectrum. Several chemicals are present in the plant which show wide pharmacological and medicinal properties. More research and evaluation needs to be done to isolate and identify different chemicals present in the plant which used for the human welfare and their future.

V. REFERENCES


