WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 13, 213-222. Review Article ISSN 2277–7105

REVIEW ON ALPINIA CALCARATA: POTENTIAL PHARMACOLOGICAL ACTIVITY

Deeksha Sahu*, Yogendra Singh, Pushpendra Kannojia

BIU College of Pharmacy, Bareilly International University, Bareilly UP- 243006, India.

Article Received on 26 May 2026,
Article Revised on 15 June 2026,
Article Published on 01 July 2026,
https://doi.org/10.5281/zenodo.21023202

***Corresponding Author**
Deeksha Sahu
BIU College of Pharmacy, Bareilly International University, Bareilly UP- 243006, India.

How to cite this Article: Deeksha Sahu*, Yogendra Singh, Pushpendra Kannojia (2026). Review On Alpinia Calcarata: Potential Pharmacological Activity. World Journal of Pharmaceutical Research, 15(13), 213–222.

ABSTRACT

Alpinia calcarata is an important medicinal herb belonging to the Zingiberaceae family, traditionally utilized for managing various ailments including cough, digestive issues, and inflammatory conditions. The rhizome is a rich source of phytoconstituents such as flavonoids, terpenoids, and essential oils, which are responsible for its biological activities. Various experimental studies have demonstrated its significant antioxidant, antimicrobial, anti-inflammatory, analgesic, and antidiabetic properties. Emerging evidence also indicates its potential role in cancer research due to its cytotoxic effects. This review provides a concise overview of the phytochemical constituents and pharmacological activities of Alpinia calcarata, supporting its relevance as a valuable candidate for natural drug discovery.

KEYWORDS: Alpinia calcarata, Zingiberaceae, phytoconstituents, antioxidant, antimicrobial, anti-inflammatory.

INTRODUCTION

Alpinia calcarata is a perennial rhizomatous medicinal plant belonging to the family Zingiberaceae, commonly known as the ginger family. It is widely distributed in tropical and subtropical regions, particularly in India and Sri Lanka. The plant is traditionally used in ayurvedic medicine system for the treatment of various diseases or ailments.

The rhizomes of **Alpinia Calcarata** are the most pharmacologically active part and are known for their aromatic properties. It is a major part of indigenous medicinal formulations

for the treatment of indigestion, impurities of blood, throat inflammation, voice improvement and to maintain youthful vigor. Traditionally, they have been used as a stimulant, carminative, anti-inflammatory, anti-asthmatic, anti-diabetic, antinociceptives, anti-helminthics, anti-fungal, anti-oxidant as well as in digestive issues.[1]

PLANT PROFILE

Alpinia Calcarata- Flower **Alpinia Calcarata-Leaves** **Alpinia Calcarata-Rhizomes**

Figure: 01

DESCRIPTION

Rhizomatous perennial herb with a non-tuberous rootstock; stems are slender and approximately 75 cm tall. Leaves are simple, alternate, measuring 25-32 cm in length and 2.5-5 cm in width, lanceolate, acuminate, and long-pointed, glabrous on both surfaces with a glossy upper side, and sparsely hairy along the margin, with sheathing petioles. Flowers are pinkish-white, irregular, bisexual, arranged in pedunculate, terminal, densely flowered panicles measuring 8.5 cm in length, with two flowers at each node, one opening prior to the other, each accompanied by a pair of bracteoles, The inner one is smaller than the outer, the bracteoles are oblong and papery white, each flower is about 4 cm long, and the pedicels are short and hairy; the sepals are fused into a campanulate tube that is 1 cm long, pubescent outside, and glabrous inside; the petals are fused at the base with the stamen into a tube that is adnate to the corolla, with two basal staminodes reduced to tiny filaments; the larger one is petaloid, measuring 3 cm by 2.3 cm ovale, yellow with vinous red streaks, emarginated, darker, glabrous, and shining on both surfaces; the stamen J is tubular, anther that is 1.5 cm long; ovary inferior, 3 mm long, strongly pubescent, 3-locular with ovules in each loculus on a central axis, capsules not seen.[2]

GEOGRAPHICAL DISTRIBUTION

The Zingiberaceae family, commonly referred to as the ginger family, is found in geographically dispersed tropical and subtropical climates. They are native to Asia, particularly Southeast Asia, the Pacific Islands, and Africa. Numerous important countries, such as Nigeria, Malaysia, Indonesia, China, India, and Thailand, are home to Zingiberaceae species. They can also be found in places with similar climates and temperatures, such as parts of the Caribbean and South America.[3]

SYNOYMS

In botanical nomenclature, the currently accepted scientific name is **Alpinia calcarata**. Its synonyms represent alternative names that have been used by researchers over time for the same species.[4]

- Alpinia alata A.Dietr.
- Alpinia bracteata Roscoe
- Alpinia cernua Sims
- Alpinia erecta Lodd. ex Steud.
- Alpinia simsii Gasp.
- Alpinia spicata Roxb.
- Catimbium erectum (Redouté) Juss. ex T.Lestib.
- Globba erecta Redouté
- Languas calcarata (Haw.) Merr.
- Renealmia calcarata Haw.
- Renealmia erecta (Redouté) Boos
- Renealmia minor Roem. & Schult.
- Alpinia Galangal

Common (Vernacular) Name

Alpinia calcarata is a highly valued medicinal plant belonging to the ginger family, celebrated for its aromatic rhizomes and striking orchid-like blooms. Because it is a cornerstone of traditional medicine across diverse cultures, it is recognized by many unique local and regional names.[5]

Region/Language	Common Name
English	Snap Ginger, Cardamom Ginger, Indian Ginger
Hindi	Kulanjan
Malayalam	Aratta (or Chittaratha)
Kannada	Chikkadumparaasme
Oriya	Toroni
Sanskrit	Rasna, Sugandhamoola, Kulanjana
Telugu	Dumparashtramu
Bengali	Sugandhabacha
Sri Lanka	Heen-araththa, Arathna

TAXONOMY[06]

Kingdom	Plantae
Phylum	Tracheophyta
Division	Mangnoliphyta
Class	Liliopsida
Order	Zingiberales
Family	Zingiberaceae
Genus	Alpinia
Species	Alpinia calcarata

PHYTOCONSTITUENTS

Alpinia calcarata contains many phytoconstituents and a wide range of volatile oils. It is a source of ascorbic acid, iron, fat-soluble vitamins, and sodium. These herbs have bioactive compounds like galangin, saponins, terpenoids, phenolics, carbohydrates, quercetin, alkaloids, glycosides, phytosterols, β-Sitosterol and flavonoids. These bioactive compounds have some therapeutic worth like anti-neoplastic, hypoglycemic, gastroprotective, hypo-lipidemic, antifungal and anti-inflammatory activities.[7-8] 1,8-cineol was found to be the major constituent in the oils of rhizomes and leaves while in the roots, it was α-fenchyl acetate. Apart from 1, 8-cineol, α-pinene (3.1%), camphene (4.1%), ß-pinene (9.3%), p-cymene (1.4%) and limonene (4.0%) were found as major compounds in essential oils of A. calcarata rhizomes.[09] It also contains 4- Terpeneol,Borneol,α-Terpeneol, γ-Muurolene (IS), Caratol, Fenchyl acetate, α-eudesmol. Trace amount of linalool, Fenchol, Fenchone, α-Cadinene and β-Caryophyllene and so on.[2]

PHARMACOLOGICAL ACTIVITIES

1. Antimicrobial activities

Jency George et al. (2014) reported that essential oil from Alpinia calcarata rhizomes exhibits significant antimicrobial activity. The oil showed strong antibacterial effects, particularly against E. coli and Bacillus subtilis, with moderate inhibition against other

bacterial strains. Antifungal activity was comparatively lower, though moderate inhibition was observed against Candida albicans and other fungi. Overall, the extract demonstrated greater efficacy against bacteria than fungi. The antimicrobial effect is attributed to the presence of diverse bioactive compounds.[10]

Mohd Atiar Rehman et al. (2015) reported that methanol and hexane extracts of Alpinia calcarata exhibited significant antibacterial activity against pathogens such as E. coli, Staphylococcus aureus, Streptococcus pneumoniae, Pseudomonas aeruginosa, and Vibrio cholerae. The rhizome essential oil showed strong inhibition, with maximum zones (15 mm) against E. coli and Bacillus subtilis. Moderate activity was observed against Klebsiella pneumoniae (12 mm) and other bacteria. Lower inhibition (7–8 mm) was noted against Lactobacillus spp. and related strains, indicating broad-spectrum antimicrobial potential.[1]

2. Anti-Diabetic Activity

Ramya Rajasekar et al. (2014) evaluated the antidiabetic activity of Alpinia calcarata rhizomes in streptozotocin (STZ) induced diabetic rats. Diabetes was induced using STZ (45 mg/kg) in citrate buffer. The diabetic rats were treated with ethanolic extract of Alpinia calcarata (200 mg/kg) and glibenclamide (2 mg/kg) for 30 days. Blood glucose levels were monitored weekly and biochemical studies were performed at the end of the experiment. The extract significantly improved altered biochemical parameters and reduced blood glucose levels without significant adverse effects.[11]

Arambewela et al. (2009) reported that Alpinia calcarata exhibits antidiabetic potential. Hot ethanolic extract (HEE) and hot water extract (HWE) were administered orally (250, 500, 750, 1000 and 1500 mg/kg; 1 mL DW) in normal and Streptozotocin-induced diabetes rats. In normoglycemic rats, both extracts significantly ($P < 0.05$) reduced blood glucose levels in a dose-dependent manner and improved oral glucose tolerance. HEE showed greater hypoglycemic effect than HWE, but neither extract reduced glucose levels in diabetic rats. Additionally, HEE decreased intestinal glucose absorption and increased glycogen storage in liver and skeletal muscle.[12]

3. Anti-Inflammatory Activity

L.D.A.M. Arawwawala (2011) The anti-inflammatory activity of Alpinia calcarata was evaluated by use of the carrageenan-induced paw oedema model in rats. In addition, the mechanisms by which Alpinia calcarata is mediated the anti-inflammatory activity was

assessed by determining its effects on (a) membrane stabilizing, (b) antihistamine and (c) prostaglandin synthesis inhibition activity. All the tested doses of AWE and AEE (250, 500, 750, and 1000 mg/kg) produced a significant ($P \leq 0.05$) inhibition of the inflammation, most pronounced at 4 h after carrageenan injection. The anti-inflammatory effect induced by 500 mg/kg of AEE was superior to that of the reference drug, indomethacin at 4 h. Inhibition of histamine and prostaglandin synthesis is a probable mechanism by which Alpinia calcarata mediates its anti-inflammatory action.[13]

Shivam Singh et al. (2023) Alpinia calcarata rhizome ethanolic extract is phytochemically and pharmacologically studied. Ethanol-soxhlet-extracted powdered rhizomes. In early phytochemical screening, carbohydrates, cardiac glycoside, protein, alkaloids, steroids, flavonoids, tannins, and phenols were found. Ingredients may reflect plant biology. The 2000 mg/kg ethanolic Alpinia calcarata rhizome extract was not harmful. The most clinically and economically burdensome asthma is allergic and inflammatory. Airway disease asthma. Smooth muscle spasm and histamine production cause bronchial asthma blowout constriction. A hydrogen peroxide-scavenging Alpinia calcarata rhizome ethanol extract. Hydrogen peroxide scavenged less than ascorbic acid. Increasing Alpinia calcarata rhizome ethanolic extract dramatically lowered power. In vitro, ethanolic Alpinia calcarata rhizome extract stabilized rabbit red blood cell membranes and prevented protein denaturation.[14]

Madhuvanthi Chandrakanthan et al. (2020) studied the anti-inflammatory potential of Alpinia calcarata essential oils from rhizome and leaves. GC-MS analysis showed major compounds like 1,8-cineole and α-terpineol. The oils significantly reduced inflammatory mediators such as nitric oxide, prostaglandins, and cytokines in a concentration-dependent manner. In mouse models, ACEO decreased ear edema, thickness, and pain responses. The study confirms strong topical anti-inflammatory and analgesic activity of the essential oil.[15]

4. Antioxidant Properties

Suprava Sahoo et al. (2020) recently investigated that the antioxidant potential of A.calcarata leaf extract was evaluated based on DPPH, ABTS, NO and H_2O_2 radical scavenging activities and total phenolic content. The result of the present study revealed that A.calcarata leaf extract exhibited the highest radical scavenging properties against ABTS radical followed by DPPH, NO, and H_2O_2 radical. It was observed that the leaf extract contained high level of phenolic content that might have accounted for the activity observed against ABTS and DPPH radicals. The findings of this study suggest that A.calcarata leaves

could be a potential source of natural antioxidants that could have great importance as therapeutic agents in preventing or slowing the progress of ageing and age-associated oxidative stress-related degenerative diseases.[16]

5. Anti-Nociceptive Activity

L S R Arambewala et al. (2004) examined the antinociceptive activity of hot water extract (HWE) and hot ethanol extract (HEE) of Alpinia calcarata rhizomes using rats and three models of nociception (tail flick, hot plate and formalin tests). Different concentrations of HWE (100, 250, 500, 750, 1000 mg/kg) and HEE (100, 250, 500, 750, 1000 mg/kg) were made and orally administrated to rats and the reaction times determined. The results showed that the extracts have marked dose-dependent antinociceptive activity, when evaluated in the hot plate and the formalin tests but not in the tail flick test. The antinociceptive effect was slightly higher in HEE than in HWE. The antinociceptive effect was mediated via opioid mechanisms.[17]

Apurwa Shyam Dhavale et al. (2025) demonstrates that ACREE's neuroprotective effect in ameliorating CIPN's detrimental impact in rat models. Through comprehensive observations like hot and cold hyperalgesia amelioration, oxidative stress and inflammation alleviation, improved motor coordination, and promoted nerve revival by limiting and reverting functional and structural (sciatic nerve morphology) damage, ACREE shows counteraction against cisplatin-induced neurotoxicity in rat models. detrimental impact in rat models. Through comprehensive observations like hot and cold hyperalgesia amelioration, oxidative stress and inflammation alleviation, improved motor coordination, and promoted nerve revival by limiting and reverting functional and structural (sciatic nerve morphology) damage, ACREE shows counteraction against cisplatin-induced neurotoxicity in rat models. This novel finding could improve cancer patient survival and life quality. Further research is recommended to elucidate the precise mechanisms of ACREE's protective effects and explore its integration with existing cancer treatments to effectively neutralize the impact of CIPN.[18]

6. Ulcer-Protective Activity

Revathy Leena Ravi et al. (2026) investigated the in vitro anti-ulcer potential of ethanolic extracts of Alpinia calcarata along with ginger using multiple experimental models. The study evaluated acid-neutralizing ability in simulated gastric fluid, inhibition of H^+/K^+-ATPase (proton pump), and neutralization capacity against artificial gastric acid. Results showed that the extract exhibited concentration-dependent acid-neutralizing activity comparable to

standard antacids like magnesium and aluminum hydroxide. The proton pump inhibition ranged from 37.32% to 75.20%, approaching the effect of omeprazole (88.28%). Overall, the findings suggest a strong gastroprotective potential of the extract through both acid suppression and enzyme inhibition. The study supports its traditional use and recommends further in vivo and clinical validation.[19]

L S R Arambewala et al. (2009) evaluated the gastroprotective activity of hot water extract (HWE) of Alpinia calcarata Roscoe (Zingiberaceae) rhizomes. Three doses (500, 750, 1000 mg/kg) of HWE were evaluated for gastroprotective activity against ethanol-induced gastric ulcers in rats. Oral administration of HWE provided dose-dependent (r2 = 0.98) and significant (P< 0.05) protection against gastric damage caused by ethanol. The gastroprotective effect of HWE was superior to that of cimetidine, the reference drug. The HWE significantly (P< 0.05) inhibited gastric volume, acidity (total and free) and significantly (P< 0.05) increased the gastric pH. On the other hand, gastric mucosal secretion remained unaltered. Further, HWE possessed significant (P< 0.05) antihistamine activity. The HWE was well tolerated: no overt signs of toxicity, hepatotoxicity (in terms of aspartate transaminase, alanine transaminase), or renotoxicity (as judged by serum urea and creatinine). It is concluded that the HWE of A. calcarata rhizome has strong and safe gastroprotective activity.[20]

REFERENCES

1. Rahman MA and Islam MS. Alpinia calcarata Roscoe: A potential phytopharmacological source of natural medicine. Pharmacognosy Reviews/Bioinformatics Trends/Pharmacognosy Review, 2015 Jan 1; 9(17): 55. Available from: https://doi.org/10.4103/0973-7847.156350
2. George M, Joseph L, Sujith K, Hafees H. Alpinia calcarata Roscoe; A Pharmacological Update. International Journal of Current Research and Academic Review, 2016 Feb 20; 4(2): 199–208. Available from: https://doi.org/10.20546/ijcrar.2016.402.025
3. Tarannum N, Kumar N, Bhati H, Tyagi N, Singh S. Comparative evaluation of potential phytopharmacological and nutritional properties of some Indigenous rhizomes of Zingiberaceae family (Alpinia calcarata, Alpinia galanga, Alpinia zerumbet) localized in Southeast Asia. Discover Chemistry [Internet], 2025 Sep 4; 2(1). Available from: https://doi.org/10.1007/s44371-025-00261-5

4. 'WFO (2026): Alpinia calcarata (Andrews) Roscoe. Published on the Internet;http://www.worldfloraonline.org/taxon/wfo-0000338386. Accessed on: 04 May 2026'
5. Alpinia calcarata - Snap Ginger [Internet]. Available from: https://www.flowersofindia.net/catalog/slides/Snap%20Ginger.html
6. https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:795225-1.
7. Revathi VM, Anuradha G, Sumathy S. An In vitro Evaluation of Antidiabetic Activity of Alpinia galangal and Alpinia calcarata. Journal of Pharmaceutical Research International [Internet], 2021 Dec 14; 28–35. Available from: https://doi.org/10.9734/jpri/2021/v33i57b34025
8. Revathi VM, Anuradha G, Sumathy S. An In vitro Evaluation of Antidiabetic Activity of Alpinia galangal and Alpinia calcarata. Journal of Pharmaceutical Research International [Internet], 2021 Dec 14; 28–35. Available from: https://doi.org/10.9734/jpri/2021/v33i57b34025
9. Arawwawala LDAM, Arambewela LSR, Ratnasooriya WD. Alpinia calcarata Roscoe: A Rich Source of Phytopharmaceuticals in Sri Lanka. The Natural Products Journal, 2012 Oct 1; 2(4): 263–9. Available from: https://doi.org/10.2174/2210315511202040263
10. George J, Department of Biotechnology, Malankara Catholic College. Analysis Of Phytochemical Constituents And Antimicrobial Activities Of Alpinia calcarata Against Clinical Pathogens. Vol. Vol 5, International Journal of Pharma Sciences and Research (IJPSR), 2014 Sep p. 555.
11. Rajasekar R, Manokaran K, Rajasekaran N, Duraisamy G, Kanakasabapathi D. Effect of Alpinia calcarata on glucose uptake in diabetic rats-an in vitro and in vivo model. Journal of Diabetes & Metabolic Disorders [Internet], 2014 Feb 6; 13(1): 33. Available from: https://doi.org/10.1186/2251-6581-13-33
12. Arambewela LS, Arawwawala LD, Ratnasooriya W. Hypoglycemic and antihyperglycemic activities of the aqueous and the ethanolic extracts of Alpinia calcarata rhizomes in rats. Pharmacognosy Magazine, 2009 Oct 1; 5(20): 412.
13. Arawwawala LDAM, Arambewela LSR, Ratnasooriya WD. Alpinia calcarata Roscoe: A potent antiinflammatory agent. Journal of Ethnopharmacology [Internet], 2011 Dec 27; 139(3): 889–92. Available from: https://doi.org/10.1016/j.jep.2011.12.036
14. Singh S, Kar NR, Kaur AK, Jaiswal M, Srikanth MS, Ashok PK, Kolgi RR, Nivas AV. A pharmacological evaluation of ethanol extract of Alpinia calcarata rhizome for anti-

oxidant, anti-inflammatory and anti-asthmatic properties. **J Adv Zool,** 2023; 44(S-1): 917–928.

15. Chandrakanthan M, Handunnetti SM, Premakumara GSA, Kathirgamanathar S. Topical Anti-Inflammatory Activity of Essential Oils of Alpinia calcarata Rosc., Its Main Constituents, and Possible Mechanism of Action. Evidence-based Complementary and Alternative Medicine [Internet], 2020 Jan 1; 2020(1): 2035671. Available from: https://doi.org/10.1155/2020/2035671
16. Sahoo S, Kar SK, Sahoo BC, Nayak S, Kar B. Free radical scavenging potential of Alpinia calcarata Roscoe leaves. Research Journal of Pharmacy and Technology [Internet], 2020 Jan 1; 13(7): 3356. Available from: https://doi.org/10.5958/0974-360x.2020.00596.x
17. Arambewela LSR, Arawwawala LDAM, Ratnasooriya WD. Antinociceptive activities of aqueous and ethanolic extracts of Alpinia calcarata rhizomes in rats. Journal of Ethnopharmacology [Internet], 2004 Sep 28; 95(2–3): 311–6. Available from: https://doi.org/10.1016/j.jep.2004.07.015
18. Dhavale AS, Hariprasad MG, Ramaswamy R. Exploring neuroprotective activity of ethanolic rhizome extract of Alpinia calcarata in cisplatin-induced peripheral neuropathy in rats. Journal of Applied Pharmaceutical Science [Internet], 2024 Jan 1; Available from: http://dx.doi.org/10.7324/japs.2024.191133
19. Ravi RL, Rani RJ, In Vitro Study of Anti-Ulcer Activity of Alpinia calcarata with Ethanol Extract. Int J Drug Deliv Technol, 2026; 16(2): 483-488; DOI: 10.25258/ijddt.16.2.5
20. Arambewela LS, Arawwawala LD, Ratnasooriya WD. Effect of Alpinia calcarata rhizomes on ethanol-induced gastric ulcers in rats. Pharmacognosy Magazine, 2009 Jul 1; 5(19).