



# Preliminary Phytochemical Screening And In-Vitro Anti-Inflammatory Activity Of Stems Of *Caralluma Adscendens*

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## ABSTRACT

This study investigates the preliminary phytochemical screening and in-vitro anti-inflammatory activity of *Caralluma adscendens* stems from the Apocynaceae family. Pharmacognostical evaluations, including physicochemical parameters such as ash values, extractive values, loss on drying, and foaming index, were conducted for plant identification and authentication. Phytochemical screening of the ethanolic extract confirmed the presence of bioactive compounds such as alkaloids, carbohydrates, tannins, phenolic compounds, flavonoids, terpenoids, steroids, and saponins. The anti-inflammatory activity was evaluated using the bovine serum albumin (BSA) denaturation method, where the extract showed dose-dependent inhibition of protein denaturation, with 10 µg/ml achieving 86.91% inhibition, close to the 89.43% inhibition observed with the standard drug, Diclofenac sodium. These findings support the traditional use of *Caralluma adscendens* for its anti-inflammatory properties and suggest its potential for further research to isolate active compounds and develop herbal-based anti-inflammatory drugs.

**Keywords:** *Caralluma adscendens*, phytochemical screening, anti-inflammatory activity, bovine serum albumin (BSA) denaturation, ethanolic extract, bioactive compounds, pharmacognostical evaluation, medicinal plants, protein denaturation inhibition, herbal medicine..

## INTRODUCTION

Medicinal plants are an important part of our natural wealth. They serve as important therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines. The history of medicinal plant use for treating diseases and ailments is probably dates back to the beginning of human civilization. Recently, the World Health Organization (WHO) estimated that 80% of people worldwide rely on herbal medicines partially for their primary health care. In Germany, about 600-700 plant-based medicines are available and are prescribed by some 70% of German physicians.

Medicinal plants have been an integral part of traditional healthcare systems for centuries, providing natural remedies for various ailments. Among them, *Caralluma adscendens*, a succulent plant from the Apocynaceae family, has gained attention for its potential medicinal properties. Widely distributed in India, this plant has been traditionally used for its anti-inflammatory, antioxidant, anti-diabetic, and wound-healing properties.

*Caralluma adscendens* is rich in bioactive compounds such as pregnane glycosides, flavonoids, tannins, saponins, and steroids, which contribute to its pharmacological activities. The growing interest in herbal medicine as an alternative to synthetic drugs has encouraged researchers to explore its therapeutic potential, particularly in inflammation management. Inflammation is a biological response to injury or infection, but chronic inflammation is associated with various diseases, including arthritis, cardiovascular disorders, and cancer. While conventional anti-inflammatory drugs such as Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are effective, they often come with side effects like gastric irritation and cardiovascular risks, highlighting the need for safer alternatives.

## BOTNICAL INFORMATION



**Plant of *Caralluma adscendens***

### SCIENTIFIC NAME

: *Caralluma adscendens*

### SYNONYMS

: *Caralluma attenuate* & *Caralluma fimbriata*

### TAXONOMY

Domain	- Eukaryote
Kingdom	- Plantae
Phylum	- Magnoliophytina
Subphylum	- Spermatophytina
Class	- Magnoliosida
Sub Class	- Lamiidae
Order	- Gentiananae
Family	- Apocynaceae
Genus	- Caralluma
Botanical Name	- <i>Caralluma adscendens var. garacilis</i>

### VERNACULAR NAMES

Tamil	- Kallimulaiyan
Kannada	- Maakada singi
Sanskrit	- Yugmaphallottama
Marathi	- Makadshingi
Telugu	- Kaarallamu

## ORIGIN

Is found in peninsular India (Dekkan Peninsula, from the Konkan southwards), and also Sri Lanka and in the Ava district of Burma.

## GEOGRAPHICAL DISTRIBUTION

The genus *Caralluma* comprising nearly 120 species and widely present in all over the world. The species is distributed ranges from India and Sri Lanka through the Arabian Peninsula to North Africa and the Sahel. In India the plants are available in Tamil Nadu, Andhra Pradesh, and Karnataka.

## HABITAT

This species thrives in xerophytic conditions, commonly found on bare slopes and stony grounds from plains up to elevations of 600 meters. It is often encountered as a roadside shrub or used as a boundary marker in rural areas.

## HABIT

*Caralluma adscendens* is a small, shrubby succulent with erect 4-angled branches and minute leaves present only on young branches, soon falling off and leaving a tooth-like projection on the angles.

## DESCRIPTION

*Caralluma adscendens* is a small shrub. It grows upto 30 - 60cm tall in height. The stem bases are up to 2cm in diameter. The plant is harvested from the wild as a local source of food and medicine.

## MATERIALS AND METHODS

### COLLECTION OF SAMPLES OF *CARALLUMA ADSCENDENS* STEMS

The plant *Caralluma adscendens* belonging to family "Apocynaceae" are widely available in Tamilnadu. For present work the plant *Caralluma adscendens* was collected from the Gowrichettipatty, near to Pennagaram.

### PURIFICATION OF SOLVENTS

#### Ethanol

**Method:** A dry round bottom flask was fitted with a double surface condenser and a calcium chloride guard tube. Dry magnesium turnings (5mg) and iodine (0.5gm) were placed in the flask followed by 50-75ml of commercial absolute alcohol. The mixture was warmed until the magnesium is converted to ethanol ate, then 900ml of commercial absolute alcohol was added and refluxed for 30 minutes. The ethanol is distilled into vessel and used.

### PREPARATION OF EXTRACTS

Preparation of extracts of *Caralluma adscendens* powdered stems by using Ethyl alcohol.

### SOXHLET EXTRACTION

About 250gm of dried stem powder of each of the *Caralluma adscendens* was taken separately in a soxhlet apparatus and extracted exhaustively with 750 ml of 99.9% ethanol until the colour of siphon changes, the extracts was filtered. Cooled and concentrated under pressure in a rotary evaporator to a syrupy consistency followed by dried using a freeze dryer, the percentage yields of each plant are given in table no. 3. The extract was stored in air-tight container until further use.



**Soxhlet Extraction**

## PHYSIOCHEMICAL EVALUATION STUDIES

The quantitative determination of some pharmacognostical parameters is useful for setting standards for crude drugs. The moisture content of the drug is not too high; thus, it could discourage bacterial, fungi or yeast growth. Equally important in the evaluation of crude drugs, is the ash value and acid-insoluble ash value determination. The total ash is particularly important in the evaluation of purity of drugs, the presence or absence of foreign inorganic matter such as metallic salts and/or silica. The results of physicochemical parameter analysis of crude powder are *Caralluma adscendens* shown in.

### Physiochemical Analysis of *Caralluma adscendens*.

**TABLE NO. 01**

S.NO	PARAMETER	RESULTS (% W/W)
1.	Loss on drying	8.82%
2.	Total ash	19.6%
3.	Acid- insoluble ash value	9.8%
4.	Water-Soluble Ash Value	9.1%
5.	Sulphated Ash value	55.4%
6.	Alcohol Soluble Extractive	6.9%

**PRELIMINARY PHYTOCHEMICAL STUDIES OF *CARALLUMA ADSCENDENS*.**

Preliminary phytochemical screening showed the presence of alkaloids, flavonoids, carbohydrates, tannins, Steroids, Saponins and Terpenoids.

**TABLE NO. 02**

S.NO	PHYTOCONSTITUENTS	ETHANOLIC EXTRACT
1	Carbohydrates	+
2	Alkaloids	+
3	Glycosides	-
4	Saponins	+
5	Tannins & Phenolic compounds	+
6	Flavonoids	+
7	Steroids	+
8	Proteins & Amino Acids	-
9	Terpenoids	+

**Result:** (+) = Present (-) = Absent

**DETERMINATION OF FOAMING INDEX**

Reduce about 1 g of the herbal material to a coarse powder (sieve size no. 1250), weigh accurately and transfer to a 500-ml conical flask containing 100 ml of boiling water. Maintain at moderate boiling for 30 minutes. Cool and filter into a 100-ml volumetric flask and add sufficient water through the filter to dilute to volume. Pour the decoction into 10 stoppered test-tubes (height 16 cm, diameter 16 mm) in successive portions of 1 ml, 2 ml, 3 ml, etc. up to 10 ml, and adjust the volume of the liquid in each tube with water to 10 ml. Stopper the tubes and shake them in a lengthwise motion for 15 seconds, two shakes per second. Allow to stand for 15 minutes and measure the height of the foam shown in.

TABLE NO. 03

Sl.NO	TEST VOLUMETRIC FLASK NO. (10ML)	HIGHT OF FOAM (cm)
1.	1	-
2.	2	0.1
3.	3	0.3
4.	4	0.5
5.	5	0.6
6.	6	0.6
7.	7	0.9
8.	8	0.8
9.	9	0.7
10.	10	1

Thus, the foaming index for the powdered stems of *Caralluma adscendens* was found to be more than 100.

## IN- VITRO ANTI-INFLAMMATORY ACTIVITY

### PROCEDURE

#### Materials Required:

To perform the Protein Denaturation assay to evaluate the anti-inflammatory activity of *Caralluma adscendens* stem extract, we require certain chemicals and apparatus, such as:

1. *Caralluma adscendens* extract (SAMPLE)
2. Diclofenac Sodium (STD)
3. 1% Bovine Serum Albumin (BSA) solution
4. Phosphate Buffered Saline (PBS, pH 6.4)
5. Incubator (37°C)
6. Water bath (70°C)
7. Spectrophotometer (660 nm)
8. Test tubes
9. Pipettes

#### Bovine Serum Albumin (BSA) Denaturation Assay

The in vitro anti-inflammatory activity of *Caralluma adscendens* was evaluated using the bovine serum albumin (BSA) denaturation method. The test sample was prepared in methanol at concentrations of 2, 4, 6, 8, and 10 µg/ml, while Diclofenac sodium, used as the standard drug, was prepared at a concentration of 6 µg/ml. The reaction mixture (3 ml) consisted of 50 µl of the test solution or standard drug solution, along with 450 µl of 5% w/v BSA solution. For the control, 50 µl of distilled water was used instead of the test solution.

All test tubes were incubated at 37°C for 20 minutes, followed by heating at 57°C for 3 minutes to induce protein denaturation. After cooling to room temperature, 2.5 ml of phosphate-buffered saline (PBS, pH 6.3) was added to each tube, and the absorbance was measured at 660 nm using a spectrophotometer.

The percentage inhibition of protein denaturation was calculated using the standard formula.

$$\% \text{ Protein Denaturation Inhibition} = \frac{\text{Abs of control} - \text{Abs of sample}}{\text{Abs of control}} \times 100$$

×100

Abs of control

Abs control = Absorbance of control (BSA + distilled water)

Abs sample = Absorbance of test sample or standard drug

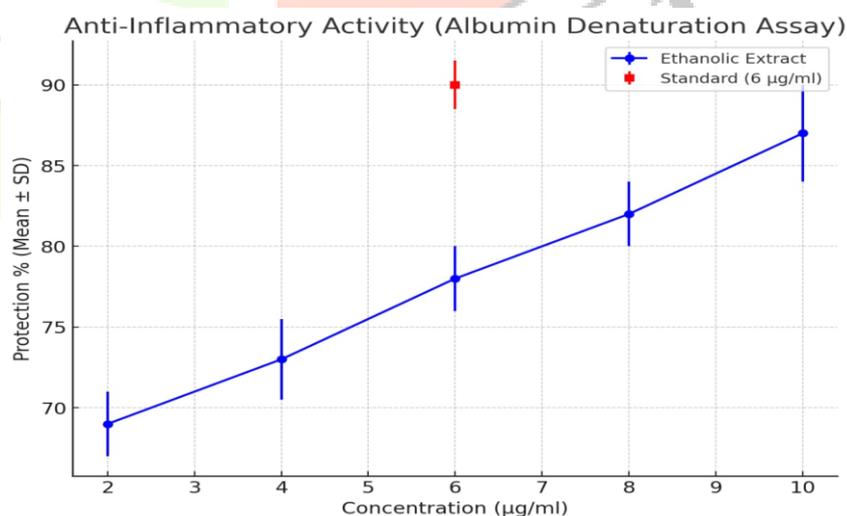
TABLE NO. 04

**IN- VITRO ANTI-INFLAMMATORY ACTIVITY OF ETHANOLIC EXTRACT OF *CARALLUMA ADSCENDENS***

S.NO	Extract	Concentration $\mu\text{g/ml}$	Protection% Mean $\pm$ SD
1	Ethanolic Extract ( <i>Caralluma Adscendens</i> )	2	68.56 $\pm$ 1.23
2		4	72.78 $\pm$ 1.64
3		6	77.12 $\pm$ 1.87
4		8	81.23 $\pm$ 1.21
5		10	86.91 $\pm$ 2.06
6	Standard (Diclofenac Sodium)	6	89.43 $\pm$ 1.36

In the present study it was observed that all the extracts have shown positive response to certain degree of Anti-inflammatory activity. Whereas ethanol extract of plant shown significant activity as compared to standard.

**SAMPLES AND GRAPH**



**Result:** The present study involves the evaluation of the preliminary phytochemical and pharmacological activities of *Caralluma adscendens*.

Physicochemical constants of the stems of *Caralluma adscendens*, such as ash values, extractive values, and loss on drying, were determined and recorded in Table no-1.

Preliminary phytochemical screening confirmed the presence of various bioactive compounds including alkaloids, carbohydrates, tannins, phenolic compounds, flavonoids, terpenoids, and saponins. The results were tabulated in Table no-2.

The foaming index test, conducted to determine the saponin content in an aqueous decoction of the plant material, revealed a foaming index of more than 100, as recorded in Table no-03.

Inflammation is a natural immune response to injury, infection, or harmful stimuli, characterized by redness, swelling, pain, and heat. While synthetic anti-inflammatory drugs are commonly used, they often come with side effects, leading researchers to explore plant-based alternatives. Many studies have reported that medicinal plants possess potent anti-inflammatory properties.

It was observed from the study that the ethanolic extract of *Caralluma adscendens* exhibited significant anti-inflammatory activity. The extract was tested using the bovine serum albumin (BSA) denaturation method, with concentrations of 2, 4, 6, 8, and 10 µg/ml, while Diclofenac sodium (6 µg/ml) served as the standard drug. The findings revealed that the ethanolic extract effectively inhibited protein denaturation in a dose-dependent manner, with the highest concentration (10 µg/ml) providing 86.91% protection, compared to 89.43% for the standard drug Table no-04. This suggests that *Caralluma adscendens* contains bioactive compounds with promising anti-inflammatory potential, supporting its traditional medicinal use.

## CONCLUSION

The Stems of *Caralluma adscendens* from the family Apocynaceae were studied to provide a detailed report on preliminary phytochemical screening and in-vitro anti-inflammatory activity. Pharmacognostical evaluations and physicochemical parameters such as ash values, extractive values, loss on drying and foaming index were established, aiding in the proper identification and authentication of the plant for future reference. Based on the present findings and existing literature, *Caralluma adscendens* has been confirmed to possess significant anti-inflammatory potential, with the ethanolic extract displaying promising activity. Further research can focus on isolating and characterizing the active constituents responsible for its pharmacological effects, potentially leading to the development of herbal-based anti-inflammatory drugs.

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