Review of the Phytochemical Analysis of the Medicinal Herb *Caralluma adscendens*

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Abstract- **Medicinal herbs are growing more and more popular as people choose natural cures and health practices instead of synthetic chemicals, which is a transition from the fringe to the mainstream. Human diseases and afflictions have been treated with Caralluma adscendens, a plant used in many traditional medicinal systems. Numerous glycosides, flavonoids, and steroids are among its constituents, according to studies. There are reports that Caralluma adscendens has hypoglycemic, anti-ulcer, antioxidant, anti-diabetic, analgesic, and anti-inflammatory qualities. Its traditional uses include treating wound healing, dermatitis, anti-obesity, and bloating. To fully understand the pharmacological potential of Caralluma adscendens, more research is necessary as a number of its isolated ingredients have not been shown to have any pharmacological effects. According to scientific evaluations and traditional applications, Caralluma is one of the most extensively used genera in several regions of the world. In addition to enhancing their biological potency, more research on the structure activity relationship of some isolated compounds may allow scientists to take advantage of the genus's historical applications. Because they have nutritive and phytochemical qualities, plants are crucial for sustaining overall health. Each of these compounds supports the defense of the bodily functions that are essential to health.**

Key words: **Phytochemistry, Traditional applications, Caralluma adscendens, pharmacological activity.**

INTRODUCTION:

With an estimated 25,000 potent formulations utilized in folk medicine, medicinal herbs—known for their therapeutic uses—stand out as a major booster for plant-based medications and are essential for maintaining health. These cures are very well-liked in India's rural areas, demonstrating the country's enormous collection of medicinal plants that are essential to conventional medical practices. (1) (2) Caralluma fimbriata, also known as Caralluma adscendens var. fimbriata, is a succulent cactus that has been used historically in India as a famine food and as an appetite suppressant. It is a member of the Asclepiadaceae family. This perennial herb yields a hydroethanolic extract that is currently sold as a botanical dietary supplement with possible anorectic effects. While controlling daily food intake, encouraging physical activity, and using medications has long been the mainstay of the conventional strategy to combat obesity and related health risks, the recent addition of natural herbal remedies has increased the range of treatments that are now available. (3) This succulent cactus is known by the names Ranshabar, Makad shenguli, Kullimudayan, and Shindula makadi in Western India. India is home to several other Caralluma species, such as C. indica, C. attenuata, C. umbellata, and C. Native Indians in India commonly eat all these varieties of Caralluma, which are botanically and phytochemically similar to C. fimbriata. Caralluma fimbriata is a vegetable that the people of the Kolli Hills in South India eat on a regular basis. In the drier regions of Andhra Pradesh, however, it is used to make chutney and pickles. Recognized as a famine meal in Western India, Caralluma fimbriata is known for its ability to curb appetite and relieve thirst. Legend has it that during long hunts, hunting tribes would chew bits of the Caralluma cactus to ward off hunger and thirst. Throughout the Indian subcontinent's centuries of use, Caralluma fimbriata has not been linked to any negative side effects. It is listed as a vegetable in both The Wealth of India and the extensive list of medicinal plants maintained by the Indian Health Ministry. Sitosterol, hexadecanoic acid, oleic acid, pregnane glycosides, flavone glycosides, megastigman glycosides, bitter principles, alkaloids, saponins, different flavonoids, and more are important phytochemical components. Caralluma has developed into a very valuable type of "portable food" and is sometimes referred to as "famine food" because to its capacity to provide sustenance during periods of extreme famine for people traveling great distances. (2) To determine how Caralluma fimbriata extract affects food intake, anthropometry, and appetite in adult Indian men and women, an investigation was carried out. This study demonstrated the extract's potential medical applications in the treatment of rheumatism, diabetes, leprosy, and other ailments, as well as its antiseptic and disinfectant properties. (4) Although Caralluma fimbriata contains a variety of phytochemical ingredients, including megastigmane glycosides, pregnane glycosides, flavone glycosides, saponins, and different flavonoids, it is crucial to remember that while many of these compounds have anxiolytic properties, CF is not known to cause sedation. (5) (6) (7) Pregnane glycosides, which explain a range of biological activities, including antimicrobial effects, are responsible for the effectiveness of Caralluma adscendens aqueous extracts against pathogenic bacteria like S. typhi, E. coli, and

Pseudomonas aeruginosa, as well as the petroleum extract from the same plant showing efficacy against S. aureus and E. coli. (8)

Origin and distribution of the caralluma adscendens in geography:

A notable succulent cactus plant with therapeutic value, Caralluma Adscendens is also known as Caralluma Fimbriata. It is a member of the Apocynaceae family, a genus of flowering plants that was first described in an illustration in 1832. There are 2500 species in this large family, spread across 200 genera. Within the Asclepiadaceae family, the Caralluma genus includes fifty different species of succulent plants. These plants typically have a height of 30 to 60 (or 100) cm with a basal stem diameter of up to 2 cm. They have a concavely 4-angled construction. The stem's tip tapers to a sharp point and has noticeable reddish staining. The plant has blunt tubercles that can protrude horizontally or vertically, along with latex.

Caralluma leaves are small, basic, and have a rustic appearance. The axillary, dispersed, bisexual blooms have a regular, 5-merous structure and are 1-2 in number per cluster. These drooping flowers have a foetid odour and are held upright by 1-4 mm long pedicels. The sepals are 2-3 mm long, triangular, and sharp. The stem, leaves, and blooms of this plant are among its botanical characteristics that make it unique in the world of succulent plants. (9)

Pakistani tea, which has long been drunk, has been shown to be effective in treating diabetes. Notably, it has been discovered that C. sineaica and C. edulis are agents that can considerably lower glucose levels. An efficient method for treating diabetes is to combine extracts from C. attenuata and C. edulis with phlorizin extract. Chewing the fresh plant of C. tuberculata three times a day, after meals, for a month is a long-standing custom in Quetta, Pakistan, aimed at controlling diabetes. (10)

Caralluma is a plant genus known for its morphologically erect, creeping, and scrambling succulent herbs with tetragonal branches. It is widely distributed throughout Asia (including Afghanistan, India, Iran, Pakistan, and Sri Lanka), Africa, the Arabian Peninsula, the Canary Islands, and Southeast Europe. The Arabic "qarhalluhum," which means "wound in the flesh" or "abscess," is the Arabian root of the word "Caralluma." Although caralluma and bougainvillea are sometimes used interchangeably, their floral arrangements are different.

Initially, certain Indian succulent plants with elongated flowering patterns were grouped under the Caralluma genus by R. Brown. In 1834, Wight and Arnott introduced a division within the Caralluma genus, creating two new genera: Hutchinia and Boucerosia. Boucerosia is characterized by plant

species with flowers in terminal umbels and is widely distributed in Arabian, Indian, and Mediterranean regions worldwide. (11)

In the traditional diabetes treatment of Quetta, Pakistan, people commonly consume C. tuberculata in the form of tea. Additionally, significant reductions in glucose levels can be achieved through the consumption of C. edulis. Combining extracts of C. attenuata and C. edulis with phlorizin extract is also an effective method for diabetes management. Furthermore, as part of the traditional regimen in Quetta, individuals chew the fresh plant of C. tuberculata three times a day for one month after meals. (12)

In Andhra Pradesh, India, the stem tendrils of C. adscendens and C. attenuata find application in the preparation of chutney and curry. Within the Madurai district of Tamil Nadu, C. adscendens is deliberately cultivated in sacred groves, valued for its cooling properties and efficacy in ulcer treatment. It is Referred to as 'Indian Hoodia,' C. fimbriata has served as an appetite suppressant in India since Vedic times. (13)

TAXONOMICAL CLASSIFICATION (14)

Kingdom	-	*Plantae*
unranked	-	*Angiosperms*
unranked	-	*Eudicots*
unranked		*Asterids*
Order	-	*Gentianales*
Family	-	*Asclepiadaceae*
Genus	-	*Caralluma*
Species	-	*Fimbriata*

Figure 1: *Caralluma adscendens* plant

CHEMICAL CONSTITUENTS

This plant grows in hilly and deciduous regions all over India. Triterpene-rich latex, as well as Indole alkaloids, Phenanthrene, Indozolidine, Glycosides, Saponin, and Tannins, are frequently found in latex cells. In their home nations, several of the members are employed in folk medicine. The genus includes compounds such as pregnane glycosides, flavones, megastigmane glycosides, steroidal glycosides, saturated and unsaturated hydrocarbons, aromatic and nonaromatic volatile chemicals, and -sit sterol. (15)

Steroids are abundant in the petroleum ether extract, alkaloids and steroids can be found in the chloroform extract, and a combination of steroids, saponins, alkaloids, glycosides, flavonoids, tannins, carbohydrates, and proteins can be found in the methanolic extract. In contrast, the aqueous extract contains amino acids, carbohydrates, tannins, flavonoids, glycosides, and saponins.(16)

Active ingredients in the plant include sitosterol, tomenkogenin, Bouceroside I–X, Caratuberside A, and Caratuberside B. (17)

PHYTOCHEMICAL SCREENING

The entire plant included large amounts of alkaloids, flavonoids, glycosides, phenolic compounds, saponins, and quinones, according to the phytochemical screening of the methanolic extract. These constituents are plausibly accountable for the varied therapeutic attributes ascribed to Caralluma fimbriata. (7)

Qualitative chemical tests are used in phytochemical screening to determine which kinds of chemicals are present in plant extracts. Below is a quick summary of some standard tests for various constituent classes:

1] Alkaloids: Precipitates an orange-red colour according to Dragendorff's Test.

In the Mayer's Test, a creamy white precipitate forms.

Yellow precipitate forms in the Hager's Test.

2] Flavonoids: Red colouring forms in the Shinoda Test.

Yellow precipitate forms in the lead acetate test.

Ferric Chloride Test: Depending on the type of flavonoid, this test produces colour variations (such as blue or green).

3] Saponins: Froth Test: When water is shaken, a steady froth forms.

Hemolysis test: Red blood cell lysis is visible.

4] Tannins: Green- or blue-black precipitate is formed in the ferric chloride test.

Gelatin Test: Precipitation formation when mixing with a gelatin solution.

The preliminary identification of these phytochemicals in plant extracts is aided by these techniques. It's crucial to remember that precise identification and quantification may require additional confirmation using more focused analytical methods. Furthermore, care should be taken when interpreting the results of these tests, taking into account variables like the extract's concentration, the solvent utilized, and the existence of any interfering chemicals. (18)

5] Glycosides in the heart (Keller-Killani test)

A brown ring appeared at the interface when each extract was treated with 2 ml of glacial acetic acid containing one drop of ferric chloride solution and then underlain with 1 ml of concentrated sulfuric acid. A violet ring appeared in the layer of acetic acid, and a greenish ring showed up all over the thin layer. (19)

TRADITIONAL USES:

Tribal groups in Andhra Pradesh make use of the wild plant species Caralluma adscendens, sometimes referred to as Kundaetikommulu, for culinary applications, including chutneys. There are several recorded uses for this herb; some people eat it raw as a vegetable while others make pickles out of it. (20)

Traditional ethnobotanical uses for caralluma include treating a wide range of conditions, including inflammation, fever, malaria, joint discomfort, paralysis, rheumatism, diabetes, and leprosy. While C. tuberculata has been used as a digestive aid and to treat diabetes, C. fimbriata and C. adscendens var. fimbriata have historical significance in traditional Indian medicine for similar reasons. At the moment, the main attention is on the possible appetite suppressing properties of caralluma. (21)

Caralluma lasiantha and C. adscendens var. attenuata stems are eaten by the Palliyars community in India's Western Ghats. The stem tendrils of C. attenuata and C. adscendens are used in Andhra Pradesh to make curries and chutneys. Furthermore, C. adscendens is grown in the Tamil Nadu district of Madurai in the sacred groves, where it is prized for its cooling qualities and ulcer-healing capabilities. (22)

PHARMACOLOGICAL STUDIES:

a) Anti-obesity activities:

C. fimbriata extract (CFE) was evaluated in the DIO rat model, and the results showed that it has antiobesogenic and appetite-suppressive properties. The findings showed that CFE reduced hunger and, in a dose-dependent way, attenuated the effects of obesity. These effects were consistently reflected in parameters such as feed consumption, body weight, liver weight, fat pad mass, and serum lipid profiles among the different treatment groups. Additionally, CFE addressed

latent leptin resistance linked to obesity and hyperleptinemia. The subject was found that 50 mg/kg/day of CFE was the best dose to offset the changes in hormones, body weight, fat pads, and liver caused by the CA diet. At every probe point during the trial, information about liver and kidney function was tracked. Although the cafeteria food caused a small amount of adverse liver alterations Regarding renal function, CFE showed a dosage-dependent decrease in these changes, which at the intermediate dose eventually returned them to normal. (23)

b) Appetite suppression:

The energy-sensing function in the hypothalamus sends signals. According to a different theory, C. adscendens may inhibit the production of neuropeptide-Y in the hypothalamus and ghrelin in the stomach, which would lower appetite. On the other hand, not much research has been done on how C. adscendens affects human hunger. In a human trial including adult Indian subjects, a daily extract of C. adscendens (1g/day) was observed to decrease waist circumference and suppress appetite in overweight subjects (n=50) whose BMI was greater than 25 kg/m2 over a two-month period when compared to a placebo group.

Participants' hunger levels decreased by 20% during the administration period, which might have helped the experimental group's 8% drop in energy intake. Using the visual analogue scale approach, appetite sensations such as feelings of hunger, thoughts of food, impulse to eat, and fullness of stomach were measured. We assessed dietary consumption with a modified Food Frequency Questionnaire. According to the results of the food frequency questionnaires, the appetite-suppressing impact reduced intake of fat and energy and decreased the amount of less preferred meals consumed. (24)

c) AnthelmIntic activity:

Because mature Indian earthworms, Pheretima posthuma, are identical to the human intestinal roundworm parasite in structure and physiology, they were used in the assay. Because they are easily obtained, earthworms have been used extensively for the preliminary in vitro evaluation of anthelmintic substances. Freshly butchered poultry sometimes contains Ascardia galli worms, which have been suggested as an appropriate model for anthelmintic medication screening. Six worms of the same kind were added to each of three different crude extract concentration solutions (10, 50, and 100 mg/ml) that were made in 50 milliliter quantities. When the worms were not moving, with the exception of being violently shaken, a period of paralysis was recorded. After making sure the worms did not move violently when shook or when disturbed, the time of worm death was noted. immersed in warm water (50°C). Piperazine citrate (10 mg/ml) served as the reference standard, while distilled water was used as the control. (25)

d) Anticancer activity:

By inhibiting the multiplication of cancer cells, β-sitosterol, which is isolated from C. adcendens, has proven to have chemopreventive effects on breast and colon cancer cell lines. However, long-term β-sitosterol treatment in in vitro toxicological tests demonstrated its non-toxicity and safety. Consequently, the phytochemical contents of Caralluma species that have been studied seem to have potential as a valuable source of pharmacological agents and as a means of improving general health. (26)

e) Antidiabetic activity:

It was shown that the methanolic extract of Caralluma fimbriata effectively managed the diabetic condition, including oxidative stress in the liver and kidney, by conducting a study on the effects of MCF on streptatozocin (STZ) 50 mg/kg b.w. induced diabetic rats. This finding is critical to maintaining people's health in the face of contemporary eating and lifestyle choices, where diabetes continues to be a major problem for humanity. (27)

f) Antihypertensive activity:

CFE treatment showed promise in reducing hunger, preventing obesity, and lowering blood pressure, as shown by its favorable effects on metabolic indicators in Wistar rats given a high-fat diet. Measurements of liver lipid content, total cholesterol, triglycerides, belly circumference, and organ weights were obtained after the intervention, showing the positive effects of CFE. (28)

CONCLUSION:

Before the invention of contemporary drugs, herbal medicines were the only ones used to treat illnesses. It is usual to find Caralluma adscendens in India's hilly regions. It is clear that the plant is widely used in India's traditional medical system. It has been shown to have hepatoprotective, anti-inflammatory, antiobesogenic, antioxidant, anticancer, and antifungal qualities in addition to having antibacterial and wound-healing capabilities. It is said to include tannins, steroids, glycosides, flavonoids, and saponins, among other substances. It is thought to be safe to consume Caralluma fimbriata extract at prescribed dosages based on all available evidence. As a result, this plant has great potential for use in medicine to cure a range of illnesses in people. More phytochemical and pharmacological study is required because the majority of the findings is still suggestive rather than decisive.

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