



RESEARCH ARTICLE

CISSUS QUADRANGULARIS: BRIDGING TRADITIONAL WISDOM WITH MODERN PHARMACOLOGY

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Manuscript Info

Manuscript History

Received: 20 February 2025

Final Accepted: 23 March 2025

Published: April 2025

Key words:-

Asthishrinkhala, Cissus quadrangularis, Macroscopy, Microscopy, Pharmacognosy

Abstract

Cissus quadrangularis, a perennial climber belonging to the Vitaceae family and commonly known as Hadjod in India, has been extensively studied for its pharmacological properties. This article provides a comprehensive review of the botanical characteristics, traditional uses, and phytochemical composition of Cissus quadrangularis, highlighting its importance in both traditional Ayurvedic medicine and modern pharmacology. The study outlines various pharmacological activities including analgesic, bone fracture healing, anti-osteoporotic, antiulcer, and antioxidant effects, supported by experimental evidence. Additionally, a sub-chronic toxicity study conducted on Wistar rats demonstrates the safety profile of Cissus quadrangularis even at high doses. The article concludes by underscoring the promising therapeutic potential of Cissus quadrangularis as evidenced by scientific research, offering insights into its utilization in the management of diverse health conditions.

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Introduction:-

Cissus quadrangularis, commonly referred to as Hadjod in India, is a perennial climber belonging to the Vitaceae family. This versatile plant is widely distributed across tropical regions of India and is recognized by various names in different languages (Kirtikar KR et al, 1994). Traditionally, it has been utilized by the common man to promote fracture healing. Asthishrinkhala consists of the dried aerial parts of Cissus quadrangularis L. (Family: Vitaceae). This succulent vine is characterized by jointed stems and tendrils opposite to the leaves. It thrives along hedges and is prevalent throughout the warmer regions of India.

A repository of knowledge regarding the management of various disorders, elaborating on the utilization of herbal drugs and formulations, underscores the significance of a comprehensive healthcare approach, emphasizing the equilibrium of Doshas (biological energies), Dhatus (tissues), and Malas (waste products) within the body (Kushwaha SS et al, 2024).

In Ayurveda, it is recognized for its diverse therapeutic properties, including being an alternative, anthelmintic, and a remedy for various ailments such as skin diseases, eye and ear

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diseases, among others (Chunekar KC, 2020). Modern research corroborates its efficacy in managing obesity, metabolic disorders, and exhibiting antioxidant properties.

Phytochemical analysis has revealed the presence of various beneficial compounds such as ascorbic acid, carotene, steroidal substances, and calcium. Additionally, its stem contains tetracyclic triterpenoids and steroidal principles, contributing to its medicinal properties.

Today, formulations incorporating extracts of *Cissus quadrangularis*, often combined with other active ingredients, are utilized for managing overweight, obesity, and associated complications like metabolic syndrome. Its multifaceted pharmacological profile and rich phytochemistry make it a promising candidate in both traditional and modern medicine for addressing various health concerns. It is mentioned in Bhavaprakash Nighantu in the Guduchyadi varga (Kushwaha SS et al, 2023).

Rasa	Katu, kashaya, Madhur
Guna	Sara, Ruksha, Laghu
Veerya	Ushna
Vipaka	Madhur
Karma	Pachak, Vrishya, Krimighna
Dosha karma	Vata-kapha nashak, Pittala
Rogaghnata	Ashti samharak, Arsha roga, Chakshu roga

Table 1. Rasa Panchak of Asthishrinkhala (*Cissus quadrangularis*)

Material And Methods:

Collection of the sample

Fresh stems of *Cissus quadrangularis* L. were collected from the botanical garden of Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh in the month of March 2024. The fresh rhizome was washed under running tap water and blotted dry.

Panchendriya Pareeksha (Organoleptic examination) of the fresh drug:

Organoleptic characters of the Fresh stems of *Cissus quadrangularis* L. by Shravanendriya (Auditory), Sparshanendriya (Tactile), Chakshurendriya (Visual), Rasanendriya (Taste) and Ghranendriya (Odour) has been evaluated (table 1).

Table 1. The Organoleptic evaluation of the Fresh stems of *Cissus quadrangularis* L.

Pareeksha (Examination)	Fresh
Shravanendriya (Auditory)	Characteristic sound
Sparshanendriya (Tactile)	Sub-quadrangular, Smooth, Shiny
Chakshurendriya (Visual)	Dull green or greyish brown when mature
Rasanendriya (Taste)	Pungent
Ghranendriya (Odour)	No characteristic odour

Macroscopic and microscopic evaluation

Macroscopic characters like shape, size, and margins were recorded as per visual observation. For the Micrometric evaluation, the fresh stem was used. Sections were visualized under Compound microscope after slide preparation by transverse sectioning using dissecting kit.

Results And Discussion:

Transverse section of fresh stem of *Cissus quadrangularis* L.

Macroscopic features:

The stem pieces are sub-quadrangular, flattened, and winged, with joints and constricted nodes, featuring spindle-shaped internodes. They appear smooth, shiny, and range in color from dull green to greyish-brown as they age. Branches exhibit a dichotomous pattern. Leaves, positioned alternately along the stem, are cauline and cordate-ovate in shape, lacking stipules. They are soft, thick, shiny, and have short petioles. Tendrils are brittle, long, slender, and twisted, emerging opposite the leaves at nodes.



Figure1. Macroscopy of *Cissus quadrangularis* L.

Microscopic features:

The stem exhibits a flattened, four-angled shape resembling a dumbbell, with one or two notches on each side. Each angle appears blunt in cross-section, featuring a sclerenchymatous patch just below the epidermis in each corner. The epidermis comprises a single layer of polygonal or slightly elongated cells, characterized by straight anticlinal walls and convex periclinal walls covered by a thick cuticle. In surface view, the epidermal cells are grouped into clusters of 3 to 8 due to thickened anticlinal walls. Stomata are uniformly distributed and of the anomocytic type (Joshi VK et al, 2017).

The ground tissue is divided into an outer cortex and a central pith by a ring of vascular bundles. The cortex consists of thin-walled parenchymatous cells, some of which contain calcium oxalate crystals in the form of druses up to 25 μm in diameter, as well as raphides. Some idioblasts stain red with Ruthenium Red, indicating the presence of mucilage. Circular cavities are sporadically present.

Vascular bundles are conjoint, collateral, open, and endarch, with larger and more numerous bundles found under the angles of the stem. These bundles comprise a peripheral patch of sclerenchyma cells, followed by phloem elements, phellogen, and xylem elements. The vessels exhibit annular and spiral thickenings. A peripheral patch of collenchymatous cells is associated with a group of vascular bundles.

The pith is composed of thin-walled parenchymatous cells, some of which contain druses and raphides. Cavities, larger and more abundant than those in the cortex, are present. In transverse section, the tendril displays prominent semi-barrel-shaped epidermal cells covered by a cuticle with fine striations, as observed in the surface view of the epidermis with cuticle.

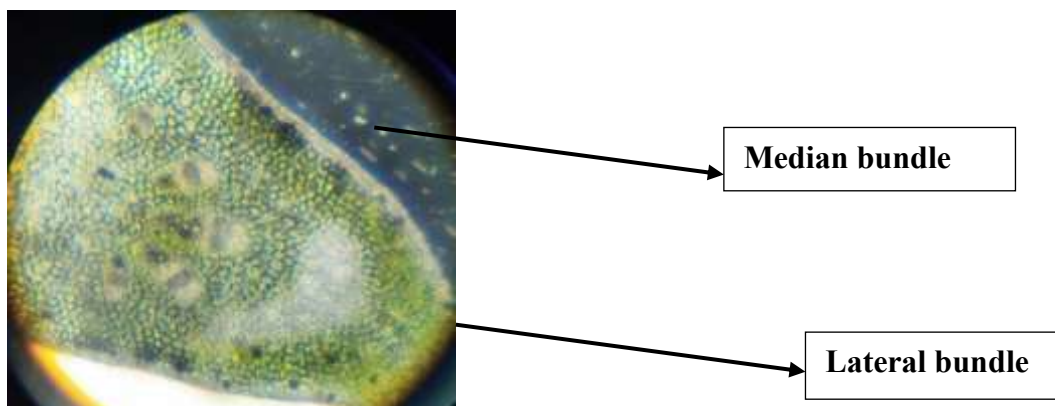


Figure 2. Microscopic structure of *Cissus quadrangularis* L.

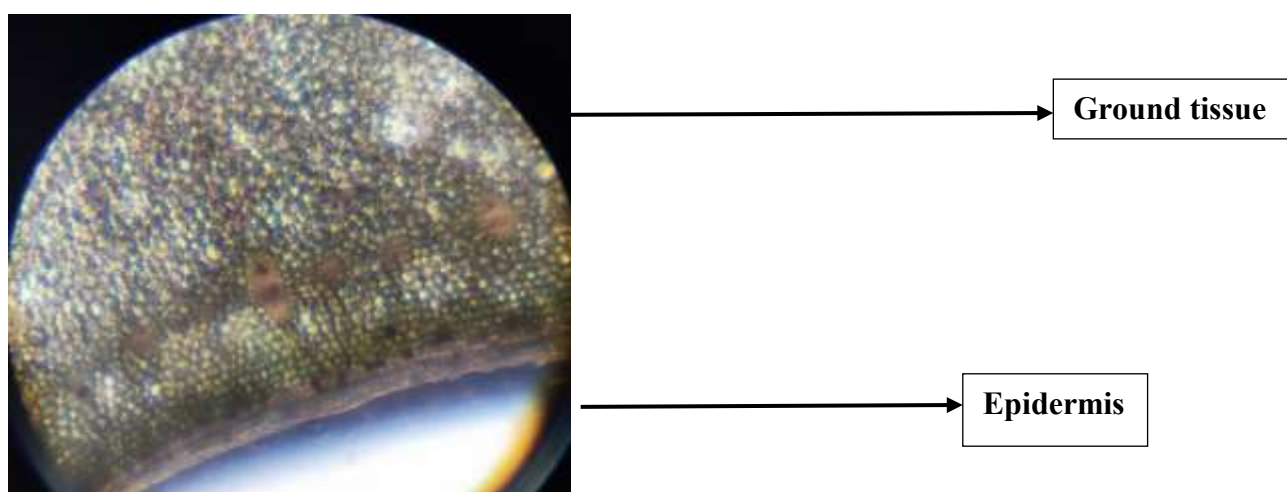
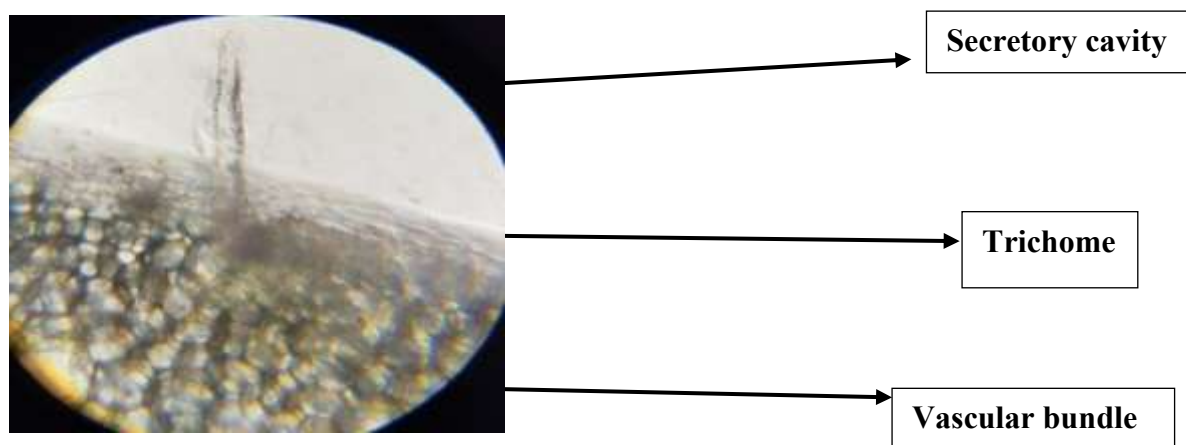


Figure 3&4. Microscopic structure of *Cissus quadrangularis* L.

Toxicity studies

A three-month sub-chronic toxicity study was conducted on Wistar rats to evaluate the safety of *Cissus quadrangularis* powder. Five groups of rats were administered different doses of the powder orally, with a control group receiving water. The results showed no significant differences in body weights between treated and control groups. Moreover, no adverse effects on haematological parameters, serum clinical chemistry, or histopathology of internal organs were observed. These findings suggest that *Cissus quadrangularis*, even at high doses, did not exhibit toxicity in rats during the study period (Mishra G et al, 2010).

Pharmacological activities

Analgesic activity- *Cissus quadrangularis* demonstrated significant analgesic activity, comparable to Acetylsalicylic acid, using Haffner's clip and Eddy's hot plate methods, with increased reaction times observed via both oral and i.p. routes, lasting 2 to 4 hours and showing optimal effect at doses ranging from 1/20th to 1/10th of LD50 (Viswanatha et al, 2006).

Bone fracture healing activity- *Cissus quadrangularis* is rich in vitamins and steroids, which exhibit specific effects on bone fracture healing. The anabolic steroidal principles derived from *Cissus quadrangularis* significantly influence the rate of fracture healing by promoting early regeneration of all connective tissues involved in the healing process and facilitating quicker mineralization of callus formation (Udupa K.N et al, 1964).

Antiosteoporotic activity- A study evaluated the anti-osteoporotic activity of *Cissus quadrangularis* ethanol extract in ovariectomized rats. Rats were divided into control and ovariectomized groups, with ovariectomized groups receiving saline or different doses of the extract. Results showed significant anti-osteoporotic effects based on biomechanical, biochemical, and histopathological parameters (Shirwaikar A et al, 2003).

Antiulcer activity- Gastric juice and mucosal studies indicated that administering *Cissus quadrangularis* at a dose of 500 mg/kg for 10 days notably enhanced mucosal defensive factors such as mucin secretion, mucosal cell proliferation, glycoproteins, and cell lifespan. These findings suggest that *Cissus quadrangularis* not only reinforces mucosal resistance against ulcerogens but also facilitates healing by stimulating cellular proliferation (Anoop A et al, 2002).

Antioxidant activity- Extracts of *Cissus quadrangularis* Linn were assessed for antioxidant activity using the β -carotene linoleic acid model and the 1,1-diphenyl-2-picrylhydrazyl model. The ethyl acetate fraction from both fresh and dry stem extracts demonstrated significant antioxidant activity at a concentration of 100 ppm, exhibiting 64.8% activity in the β -carotene linoleic acid system and 61.6% in the 1,1-diphenyl-2-picrylhydrazyl system (Brown RK et al, 1994).

Conclusion :

In conclusion, the detailed morphological and anatomical characteristics elucidate the intricate structure of *Cissus quadrangularis*, shedding light on its adaptation to diverse environmental conditions. Its sub-quadrangular, flattened, and winged stem pieces, along with spindle-shaped internodes, contribute to its distinctive appearance, which transitions from dull green to greyish-brown with age. The presence of sclerenchymatous patches beneath the epidermis, as well as the arrangement of vascular bundles and parenchymatous cells, underscores its structural integrity and potential for nutrient transport. Moreover, the identification of mucilage-containing idioblasts and the observation of calcium oxalate crystals and raphides highlight its physiological adaptations for defense and storage. Ultimately, the culmination of traditional wisdom and modern scientific research underscores the significance of *Cissus quadrangularis* as a promising botanical resource with diverse pharmacological applications, paving the way for further exploration and utilization in holistic healthcare approaches.

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