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A REVIEW ON: *CISSUS QUDRANGULARIS* L PHARMACOLOGICAL PROPERTIES

A. M. Krupanidhi*, Prakash Dabadi, Kruthi K. N., Pramod Channammanavar, S. Sanath Udupa, Mythree M. V. and Chandana M.

Department of Pharmacology Bapuji Pharmacy College, S.S. Layout Davangere-577004, Rajiv Gandhi University of Health Sciences-Karnataka, India.

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***Corresponding Author**
Dr. A. M. Krupanidhi
Department of Pharmacology Bapuji Pharmacy College, S.S. Layout Davangere-577004, Rajiv Gandhi University of Health Sciences-Karnataka, India.

ABSTRACT

Succulent herb *Cissus quadrangularis* (Family: Vitaceae) has acactus-like, squishy texture. It is also known as *Heliotropium indicum*, *Lycopodium imbricatum*, and *Vitis quadrangularis*. It is employed in Ayurveda as Pachana, a digestive aid, Sara, a constipation reliever, Athiyuk, a bone strengthener, Vrushya, an aphrodisiac, etc. It is used to cure gastritis in unani medicine. Asthma is treated with the entire plant, but bone fractures are treated with the powdered root. 30–40 grains of the powder are the typical dosage. In Southern India, leaves and young shoots are typically consumed with curries. The plant's young shoots are dried, ground up, and burned to ashes in Chennai. These ashes are used to treat indigestion, dyspepsia, and a few gastrointestinal ailments. The parts of young shoots and leaves are also regarded as effective options in gastro intestinal therapies. In cases of otorrhoea and epistaxis, stem juice is dripped into the ear. There are numerous medicinal importance, based on this our study was focused on review on *Cissus quadrangularis*.

KEYWORDS: *Cissus quadrangularis*, triterpenoids, Skeletal muscle relaxant activity, Analgesic activity.

INTRODUCTION

Cissus quadrangularis (Linn) has been used by the common man in India for the promotion of fracture healing and is well known as "Hadjod". It is also known as *Vitis quadrangularis* Wall, which belongs to the family Vitaceae (Garima Mishra *et al*., 2010). It is a common perennial climber, which is distributed throughout India, particularly in tropical

regions. Only 5–8% of the plant is made up of leaves. The green stem is fleshy and is the significant part. Young leaves and tendril shoots are utilized in a variety of food preparations. It is believed that the plant's juice can treat scurvy. The plant has significant concentrations of vitamin C, beta-carotene, anabolic steroid compounds, and columin. This herb has been used to treat asthma and scurvy, as well as an anthelmintic, antidyspeptic, digestive tonic, and an analgesic. Rats with shattered bones have been shown to mend more quickly when given the plant's alcoholic extract. *Cissus quadrangularis* has analgesic effects on Heffner's tail clip and Eddy's hot plate-induced analgesia. From this plant, two asymmetric tetracycline triterpenoids have been discovered: Onocer-7-ene, 3-α, 21- β-diol, 7-oxo-onocer-8-ene.3-β.21-α diol and 3-β-sitosterol. (K.N. Chidambara Murthy *et al.*, 2003).

Geographical Source

Cissus quadrangularis L. is found all throughout India's hotter regions, along with hedges, and is also seen in nearby nations like Pakistan, Bangladesh, Sri Lanka, and Malaysia. It can be grown in plains, coastal regions, jungles, and wastelands up to 500 m above sea level. Plant propagation is performed by the cutting method. (Sandip Buddhadev *et al.*, 2014).

Common name

English: Veldt Grape, Devil's Backbone, Adamant creeper, Bone setter, Edible stemmed vine, Square-stalked vine, Winged treebine.

Hindi: Asthibhanga, Harajora

Kannada: Mangaravalli, Sanduballi, Vajravalli, Bakkudi

Malayalam: Changalamparanda

Sanskrit: Asthibhang, Asthisamhara, Asthiyuj, Chaturdharin, Chitrakandali, Kandalata, Siralaka, Vajravalli

Tamil: Arukani, Kirutti, Pirantai, Vaccira-Valli

Telugu: Gudametige, Nalleru, Vajravalli

Urdu: Hadjod (Sandeep Buddhadev *et al*., 2014)

Taxonomy

Kingdom: Plantae

Sub kingdom: Tracheobionta

Super division: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Rhamnales

Family: Vitaceae

Genus: Cissus L.

Species: *Cissus quadrangularis* L. (Sandeep Buddhadev *et al*., 2014)

Identification of plant

This plant is a climber with perennial herbs. A thick, succulent, quadrangular, winged, constricted at the nodes, glabrous or somewhat downy stem that, as it ages, nearly completely loses its leaves. Petiole is glabrous and 6–12 mm in length. Simple oblong, whole or cordate, serrulate dentate, or crenate-serrate, 3-lobed leaves that are 3-5 x 5-3 cm in size, with terminal lobes that are triangular or sub-spathulate, subacute or cuspidate, membranous, and glabrous on both sides. It's a Compound umbelliferum cyme inflorescence, peduncle 1–2.5 cm long. . Hypanthium cup-like, truncate or obscurely lobed, green, ca. 2 mm long, pink and white flower. a 2 mm width. Petals are distinct, ovate-oblong, sharp, hooded at the apex, and about 1.5 mm long. The disc is longer than the ovary. The ovary is glabrous, the style is slender and subulate, and the stigma is small. Berry with a globose shape, red colour, succulent texture, high acidity, and one seed (4–8 mm wide, smooth, obovoid seed). (Vinod D. Rangari *et al.*,2003).

Morphology of plant Habit: A large succulent.

Stem: Long, fleshy, deep green, glabrous, quadrangular, young branches sharply angular or winged, tendrils long, simple.

Roots: The plant has a fibrous root system that extends up to 16.70 cm, and there are 8.66 lateral roots per plant.

Leaves: Deciduous, ovate or reniform sometimes 3-7 lobed, denticulate, base rounded, stipules ovate.

Inflorescence: Umbellate cymes.

Flowers: Calyx cup-shaped, Petals 4, ovate-oblong, hooked at apex, disk 4-lobed.Stamens 4, anthers introrse. Ovary bilocular, cells 2-ovuled, style short.

Fruit: Berry red, globose, seed solitary.

Anatomy of Root

The root structure exhibits an extremely wavy periderm at the outside, followed by an unevenly thickened cortex and epidermis. Vascular tubes and xylem masses make up the

inner part of the root. The periderm, which consists of 3 or 4 layers of compressed thin-walled cells, is superficial and creates strongly folded ridges and furrows. The root's ridge and furrow surface are covered by an epidermis that is largely undamaged. Parenchymatous and secondary phloem cortical cells can be found in the cortex. It comprises a broad zone of parenchyma cells with a high tannin content, dispersed sieve elements, and vague calcium crystals of druses and raphides. Similarly, the druses are greater in number than the raphide bundles and are scattered throughout the cortex. The druses are 20 m in diameter and the raphides are 20 m 60 m in size. The xylem cylinder includes six radial segments of divided xylem masses. Each segment has a few diffusely distributed vessel elements (approximately 30 m in diameter) and a wide sclerenchymatous ground tissue. The ground tissue with a honeycomb structure in the transverse section and little porosity was where the fibre bundles were primarily found. They are surrounded by secondary phloem and secondary xylem cells. The average diameter of fiber is in the range of 350–770 m. The CQRF was extracted by a natural degradation technique, as the decortications extraction method would damage the fiber structure. The extracted fibers were then studied under a polarized microscope, revealingthree distinct layers: the outer primary wall, followed by the lignified wall and secondarywall, and the cell lumen at the inner portion. (S. Indran *et al.*, 2014).

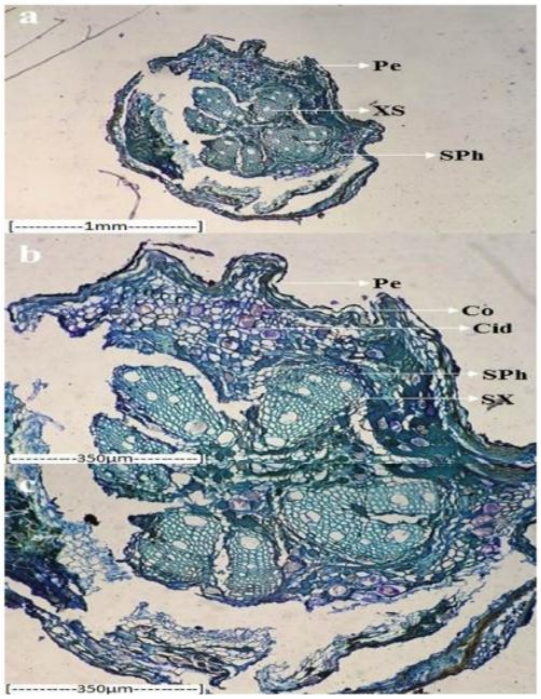


Figure 1: TS of roots of *Cissus quadrangularis.*

(Pe, periderm; XS, xylem segment; Co, cortex; Cid, crystal bearing idioblast; SX, secondary xylem; SPh, secondary phloem)

Chemical Constituents

The plant contains a variety of components, including iridoids like 6-0-meta-methoxybenzozyl catapol, picroside, and pallidol, flavanoides like quercetin, daidzein, and genistein, triterpenoids like friedelin, vitamin "C," stilbene derivatives like quadrangularinA, resveratrol, and piceatannol, and phytosterols like βsitosterol. The plant's stem includes calcium oxalate, 31-methyl tritiacontanoic acid, taraxeryl acetate, taraxeroliso-pentadecanoic acid, taraxeryl acetate, ketosetosterol, phenols, tannins, vitamin A, carotene, ions of calcium, and phosphorus. The plant's aerial portions include a brand-new asymmetric tetracyclic triterpenoid diol called 7-Oxo-Onocer-8-ene-3. Resveratrol, piceatanon, pallidol, parthenocissus, and alicyclic lipids are present in leaves. Minerals such as potassium 67.5 mg, calcium 39.5 mg, zinc 3.0 mg, sodium 22.5 mg, iron 7.5 mg, lead 3.5 mg, cadmium 0.25 mg, copper 0.5 mg, and magnesium 1.15 mg are frequently present in root powder. (Jeganath Sundaran *et al*., 2020).

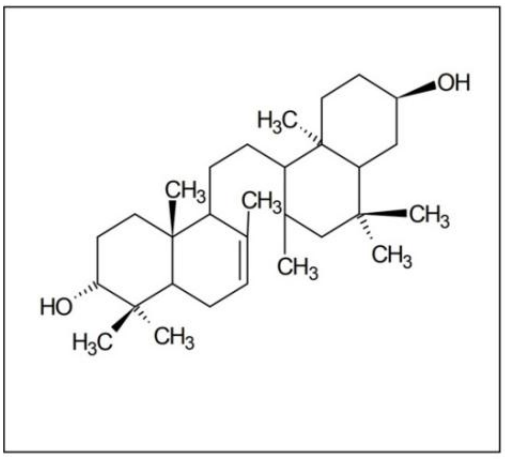


Figure 2: Onocer-7-ene, 3- α, 21- β diol.

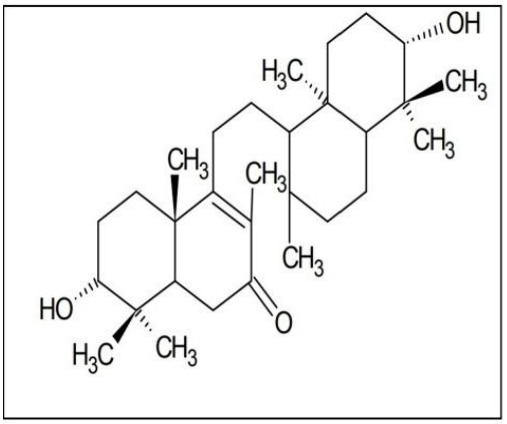


Figure 3: 7-oxo-onocer-8-ene.3-β.21-α diol.

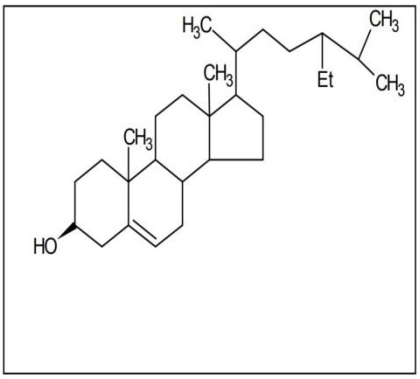
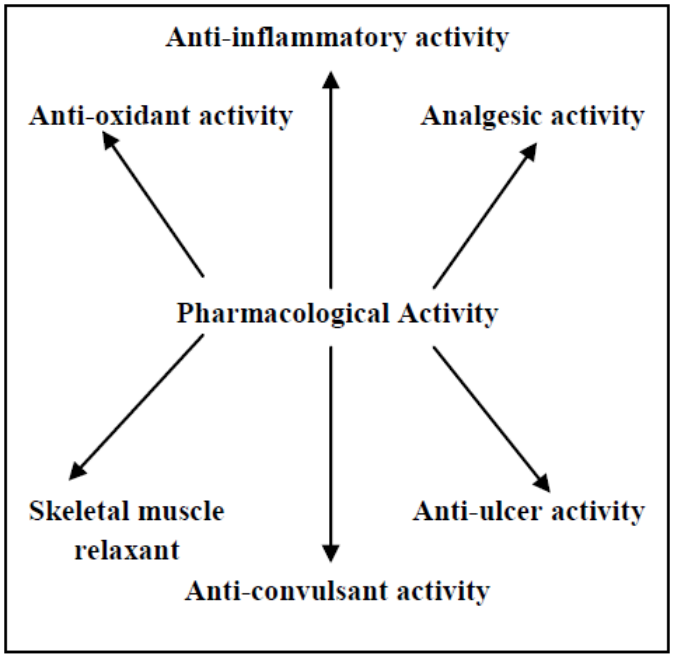


Figure 4: 3 β-sitosterol.

Therapeutic Uses

Plant's roots and stems are the greatest portions for healing broken bones. According to Ayurveda, the herb has been used to treat osteoarthritis, rheumatoid arthritis, and osteoporosis. Scurvy, menstruation issues, otorrhoea, and epistaxis are all treated using plant stem juice. Cattle are given the plant to stimulate milk production. The thick, fleshy, quadrangular stem is historically used to cure piles, anemia, gastritis, constipation, and eye disorders. (Sandeep Buddhadev *et al.*, 2014).

Pharmacological Activity



Anti-oxidant and anti-inflammatory activity

High quantities of dry fractions were produced by the extraction of the stem and root in ethanol and methanol. Additionally, tests for in vitro antioxidant activity revealed that stem

and root extract in the form of ethanol had a better capacity to scavenge free radicals than other extracts. The two free radicals that were discovered to be fifty percent inhibited by the ethanol fraction were DPPH- (IC50: 32.07 & 28.02.) and ABTS- (IC50: 115.22 & 120.06.) By providing hydrogen to the radical, the two common synthetic radicals used to assess the effectiveness of a drug's neutralizing action are DPPH and ABTS radical cations. The ethanolic fractions of the CQ stem and root both shown higher levels of neutralizing impact against those radicals, according to the data. The reactive nitrogen species NO reacts with superoxide to form the more delicate apoptotic chemical peroxynitrate. Inhibition levels of NO radicals were discovered to be (IC50: 130.05 & 470.13) in the ethanolic fractions of the stem and root. The activities against H2O2 and TAA were also discovered to be (H2O2-IC50: 21.08 & 28.09), (TAA-PI: 73.16 & 66.22), respectively. The results of this investigation demonstrated that CQ's stem and root extracts have exceptional free radical scavenging and anti-inflammatory capabilities. In this sense, CQ is a beneficial food to include in our diet in order to support our health and anti-oxidant system. (L. Dinesh Kumar *et al.,* 2019).

Skeletal muscle relaxant activity

The animals were treated orally with an aqueous extract of the root of *Cissus quandrangularis.* Place the mice individually on rotarods (25rpm). The mice's time to fall from the rot rod was recorded as' fall of time in seconds. *Cissus quandrangularis* root extract-treated animals show more skeletal muscle relaxation.

Analgesic Activity

The animals were treated with the aqueous extract of *Cissus quandrangularis* root and the animals were placed on a hot plate to maintain the temperature at 5010c and record the observation for three hours (cut off time of 15 sec) and avoid injury to the paw. Animals treated with an extract of *Cissus quandrangularis* root show significant analgesic activity. After 30 minutes, it shows maximum analgesic effect, and after 90 minutes, it shows a decline in analgesic activity. (Rajeshkumar *et al., 2010).*

Anticonvulsants

The chosen animals general health activities, eye colour, food intake, water intake, further condition, body weight, nail colour, urine volume, were observed in the preliminary screening.

In the study, mice that showed extension of the hind limb were included. Oral administration of an aqueous extract of Cissus quandragularis root to a convulsive animal induced by the maximum electric shock method The convulsion in the animal was induced by the maximal electric shock method by using an electroconvulsiometer by passing current of 45mA for 0.2s using an ear clip electrode in Swiss mice, which is inhibited by oral administration of aqueous extract of rat *Cissus quandragularis*. (Rajeshkumar *et al., 2010).*

Anti-ulcer Activity

The ethanol extract of *Cissus quadrangularis* roots has antiulcer properties against ethanol and indomethacin-induced gastric acid. NSAID (Non-steroidal anti-inflammatory drug) drugs are used to induce ulceration in the stomach lining. Pretreatment with root extract of *Cissus quadrangularis* before induce ulceration in the stomach. Ulceration rate was found to be significantly higher (0.05). This indicates that the level of ulceration in patients treated with root extract of *Cissus quadrangularis* is low due to the presence of antiulcerogenic agents. Healing of ulceration in Indomethacin-induced ulcers in the stomach is dose dependent. The ulceration that is induced by ethanol can be inhibited by a root extract of *Cissus quadrangularis*. The inhibition of ulcer is higher in Indomethacin-induced ulcers than in ethanol. (Enechi, O.C. *et al*., 2013).

CONCLUSION

The plant extract of *Cissus quadrangularis* shows various pharmacological activities which was reported as follows antimicrobial, anti-diabetic, anti-inflammatory, anti-obesity, anti-oxidant, bone turnover, cardiovascular and hepatoprotectives.

The current review concentrated on the antioxidant, anti-inflammatory, skeletal muscle relaxant activity, analgesic activity, anticonvulsant activity, and anti-ulcer activity of *Cissus quadrangularis* root.

In this review article, we have collected and compiled the details of research information on *Cissus quadrangularis*, which was summarised in this article.

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