

A PHYTOCHEMICAL AND PHARMACOLOGICAL REVIEW OF AN WOUND HEALING INDIAN PLANT: CISSUS QUADRANGULARIS

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ABSTRACT:

Cissus quadrangularis is a common perennial succulent climber plant belongs to Vitaceae family. The plant is having strong pharmacological profile with variety of phytoconstituents and is being geographically distributed throughout tropical and subtropical regions of the world. Prominently found in India, Pakistan and Bangladesh. In India plant was found all over but dominantly in states namely Assam, Kerala, Odisha, Madhya Pradesh, Tamil Nadu, and Uttar Pradesh. The plant in India popularly called as 'Hadjod' or 'Asthisamharaka' and very well established as medicines related to management of bone, muscles and ligament issues. Traditionally almost all aerial well as underground parts are having medicinal value but stem is most commonly used. Phytochemicals studies performed on plant revealed the presence of variety of constituents viz Tannins, proteins, carbohydrate, phenol flavonoids, triterpenoids, phytosterols, glycosides, Saponins, vitamin C and alkaloids. Beside these plant is also a rich source of calcium. The systematic review had also established the pharmacological role of plant as bone setter and fractured bone healer, antimicrobial, anti-diabetic, anti-inflammatory, anti-obesity, anti-oxidant, bone turnover, cardiovascular and hepatoprotective and many more. The current review article had made the detailed discussion on it phytochemical and pharmacological potential.

INTRODUCTION:

India is country with full of fauna and flora and holding a strong tradition of using these flora and fauna as food supplement and medicine. As per the available data it was estimated that higher plant species found on earth are 2,50,000 and approximately more than 70,000 are medicinal. In India alone over 45000 plant species were exist making India as worlds 12th biodiversity center The very existence of alternative system of medicines namely Siddha, Ayurveda, Unani, Naturopathy and homeopathy had clearly established the fact of very long, safe and continuous uses of herbs officially.³ As of now through systematic literature study it was evident that India had presented about 8000 medicinal species of plants from different alternatives systems and to name few 700 medicinal plant species from ayurveda, 600 species from Sidhha , 600 species of plant from Amchi, 700 medicinal plant species from Unani, 67 medicinal plant species from rigveda, 81 medicinal plant species from yajurveda, and many more like this.^{1&2} Besides the prescription drugs of alternative systems, plants are popularly being used by millions of Indian as health food, spices, home remedies and over-the-counter (OTC). The market for medical plants in India stood at Rs. 4.2 billion (US\$ 56.6 million) in 2019 and is expected to increase at aCAGR 38.5% to Rs. 14 billion (US\$ 188.6 million) by 2026. The total world herbal trade is currently assessed at US\$ 120 billion. ^{2&4} The present review study is designed by considering the rich tradition of India's medicinal plants existence. The study was having a prime focus to introduce one of the important plants of ayurveda named as *Cissus quadrangularis* popularly called as 'had-jod' or 'Asthisamharaka'.

PLANT DISCRPTION:

Habitat: *Cissus quadrangularis* is a common plant of arid habitat of tropical and subtropical regions very often found in coastal and lowland areas. The plant is very well-known in Africa and India for its medicinal use. In India and subcontinent of India like Pakistan and Bangladesh, Cissus plant occurs in thickets, open forests, scrub jungles, along forest borders, on riverbanks and wastelands at low and medium elevations.⁵

Synonyms: This aggressively growing plant was identified by several international names and regional names some important international names of *Cissus quadrangularis* are veldt grape, adamant creeper; cactus vine; kangaroo vine; stemmed vine; veldt-grape; winged treebine and Indian regional names are Had-joad, asthisamharaka, pirandai and Hadsankal.^{5&7}

Botanical description: It is a perennial herbaceous climber comprised of thick quadrangular stem along with other aerial components like tendrils, leaves, inflorescence, flower and fruits.^{7,5} The detailed description of the *Cissus quadrangularis* part wise is described below;

Stem: The stem of the plant is moist, thick, Long, fleshy, deep green, glabrous, quadrangular, angles winged, constricted at nodes, slightly downy. The stem when young show branches sharply angular or winged, tendrils long, simple and almost leafless when old.

Leaves: Leaves on the stem of plant is simple ovate or reniform, entire or cordate, serrulate dentate, or crenate-serrate, 3-7 lobed, terminal lobe triangular or sub-spathulate, subacute or ± cuspidate, membranous, glabrous on both sides, 3-5 x 5-3 cm; stipules ovate or cuneate, obtuse, deciduous.

Inflorescence: The Inflorescence found on plant Umbellate cymes with peduncle 1-2.5 cm long. Stem show presence of tendrils that are long, slender, simple.

Flower: Stem bears flower of pink to white colored and approximately 2 mm long, hypanthium cup-like, truncate or obscurely lobed, green, ca. 2 mm wide. Petals 4, distinct, ovate-oblong, acute, hooded at apex, ca. 1.5 mm long. Disc longer than the ovary. Ovary glabrous, style slender subulate, stigma small.

Fruit: The fruit of the plant are berries that are globose, red, succulent, very acidic, 6-10 mm in diameter, 1 seeded. The seeds are obovoid smooth,

PHYTOCHEMICAL PROFILE

The aerial portion of *Cissus quadrangularis* in particular stems part of plant in its preliminary phytochemical investigation through different solvent extracts had shown presence of many important primary and secondary metabolites such as, lipids (cyclic and acyclic), fatty-acids, methyl esters, protein and amino acid, iridoids, gums and mucilage, alkaloids, flavonoids and flavons, Saponins, phytosterols, flavonoids, steroids, stilbenes, and triterpenoids tannins, carotene, enzymes, nicotinic acid, tyrosin, cardiac glycosides, Saponins, and vitamins specially vitamin C.^{8°} Similar to the aerial portion when underground part of *cissus quadrangularis* when examined for phytochemical profile, it had demonstrated wide array of compounds, the dried pulverized root of the plant showed presence of alkaloids, saponins, tannins, flavonoids, glycosides with the absence of cyanogenic glycosides.

TRADITIONAL USES

The detailed literature survey of the plant *Cissus quadrangularis* had revealed that; the plant is an ancient and being used in several parts of the world to manage number of issues of humans and animals.¹¹ In Sidhha and Ayurvedic plant is reported to be used for management of Asthi i.e. bone related issues like fracture, pain, Inflammation, osteoporosis, rheumatoid and osteoarthritis.^{12^{&6}} The other areas where plant or its parts being used as medicine includes swelling, hemorrhage, hemorrhage, anorexia, flatulence, dyspepsia, colic, chronic ulcer, haemoptysis, convulsion, skin diseses, leprocy and helminthiasis.^{13,6,8}

PHARMACOLOGICAL PROFILE:

Actions related to bones:

The plant *Cissus quadrangularis* is well established herb in management of bone related ailments, and inline to this fact several studies are conducted using different animal models and even human subjects. All these studies had now established that the plant is potential role in management of bone fracture, osteoporosis, and maintenance of bone density and in general health of bones. The core understanding out of all these studies propose that plant had unidentified anabolic steroids are responsible for action through estrogenic receptor of the bone. The efficacy of plant for early ossification and remodeling of bones is an act of better stimulation of metabolism and fast uptake of minerals Viz calcium, sulpher and strontium by osteoblast.

Analgesic and anti-inflammatory activity:

Cissus quadrangularis methanolic extract had demonstrated analgesic and anti-inflammatory activity. The study performed on mice showed noteworthy reduction in the number of writhes in mice induced by acetic and also showed considerably reduced licking time in both phases of the formalin test. These responses in mice were suggestive of peripheral and central analgesic activity of the plant. In rat model plant showed effective anti-inflammatory property and showed inhibitory effect on the edema formation induced by ethyl phenylpropiolate in rat ear as well as paw edema by carrageenin and arachidonic acid.

Anti-diabetic activity

The anti-diabetic potential of C. quadrangularis stem extract, mediated through the modulation of the antioxidant defence system. The ethyl acetate fraction is rich in quercetin supplementation of the plant might be beneficial as a food supplement for the attenuation of diabetic complications. Further, antidiabetic activity of the plant is associated with potentiating the antioxidant defense system and suppressing inflammatory responses.

CONCLUSION:

The plant *Cissus quadrangularis* is a vine that grows in Africa and parts of Asia including India. It is one of the most commonly used medicinal plants in Thailand, and is also used in traditional African and Ayurvedic medicine. All parts of the plant are used for medicine. Phytochemically plant show presence of many important primary and secondary metabolites such as, lipids (cyclic and acyclic), fatty-acids, methyl esters, protein and amino acid, iridoids, gums and mucilage, alkaloids, flavonoids and flavons, Saponins, phytosterols, flavonoids, steroids, stilbenes, and triterpenoids tannins, carotene, enzymes, nicotinic acid, tyrosin, cardiac glycosides, Saponins, and vitamins specially vitamin C. facts from the earlier studies suggested the efficacy of *C. quadrangularis* in treating various ailments. The major pharmacological activities of the plant include antimicrobial, anti-diabetic, anti-inflammatory, anti-obesity, anti-oxidant, bone turnover, cardiovascular and hepatoprotective. Further, the most extensive clinical studies using standardized extracts of *Cissus* alone or in combination with other ingredients involve weight loss and the regulation of blood glucose and lipids. Thus, *Cissus quadrangularis* appears worthy of pharmacological investigations for new drug formulations.

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