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A Review On Phytochemical Evaluation And Therepeutic Applications Of *Cissus Quadrangularis*

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Abstract:

Cissus quadrangularis is a common succulent perennial climber. It is also known as 'Hadjod', is a medicinal plant that has been extensively used in traditional herbal medicine, particularly in the Ayurvedic systems of healing. This review aims to consolidate recent advances in the pharmacological and therapeutic properties of Cissus quadrangularis, focusing on its potential in treating bone-related disorders, metabolic conditions, and other ailments. The plant is rich in bioactive compounds such as flavonoids, triterpenoids, and phytosterols, which contribute to its anti-inflammatory, antioxidant, and anabolic properties. Research has demonstrated its efficacy in enhancing bone healing, reducing fractures, and improving bone mineral density, making it a promising candidate in osteoporosis treatment. Additionally, Cissus quadrangularis has shown potential in managing obesity, diabetes, and cardiovascular conditions, primarily through its modulation of lipid profiles and blood glucose levels. This review mainly highlights the therapeutic use of the plant. Despite its long-standing use in traditional medicine, further clinical studies and standardization of extracts are required to fully establish its efficacy and safety for broader medical applications.

Key words: *Cissusquadrangularis*, Bone healing activity, Antioxidant activity, anti-inflammatory activity

Introduction

Cissus quadrangularis is a perennial plant belonging to the Vitaceae family, commonly found in tropical regions of Africa and Asia. Traditionally, it has been used in folk medicine for various ailments, including bone fractures, obesity, and inflammatory conditions. Its popularity in herbal medicine is attributed to its rich phytochemical profile, which includes flavonoids, tannins, and alkaloids, known for their potential health benefits.

Research into the pharmacological properties of *Cissus quadrangularis* has gained momentum in recent years. Numerous studies have explored its effects on metabolic processes, bone health, and antioxidant activity. Preliminary evidence suggests that *Cissus quadrangularis* may aid in weight management, enhance bone density, and exhibit anti-inflammatory and antioxidant effects.

Given the rising interest in natural remedies and the need for alternative treatments for chronic conditions, a comprehensive review of the pharmacological properties of *Cissus quadrangularis* is essential. This review aims to consolidate existing research, evaluate the efficacy of the plant's bioactive compounds, and identify potential therapeutic applications. By doing so, we hope to provide a clearer understanding of how *Cissus quadrangularis* can be integrated into modern medical practices and its role in promoting overall health.

Plant Description

Habitat

Cissus quadrangularis is a common plant in the arid habitat of tropical and subtropical regions and is very often found in coastal and lowland areas. The plant is very well known in Africa and India for its medicinal uses. In India and the subcontinent of India such as Pakistan and Bangladesh, the Cissus plant can be found in thickets, open forests, scrub jungles, along forest borders, on riverbanks, and wastelands at low and medium elevations [2].

Botanical Description:

The plant is a perennial herbaceous climber comprising a thick quadrangular stem along with other aerial components such as tendrils, leaves, inflorescence, flowers, and fruits[1,3].

- **Stem**: The stems are quadrangular (square-shaped) in cross-section, which is a defining feature of the species. They are green and may become woody as they mature.
- **Leaves**: The leaves are simple and can be ovate or reniform, typically featuring 3 to 5 lobes. They are dark green, glossy, and arranged alternately along the stem, with serrated margins. The overall shape can vary from ovate to somewhat elongated.
- **Inflorescence**: The inflorescence is an umbellate cyme with peduncles measuring 1–2.5 cm in length. The stems feature long, slender, simple tendrils.
- **Flower**: The flowers are pink to white, approximately 2 mm long. The hypanthium is cup-like, truncate or obscurely lobed, green, and 2 mm wide. There are four distinct ovate-oblong petals, each 1.5 mm long, which are acute and hooded at the apex. The flower is disc-shaped and longer than the ovary. The ovary is glabrous, with a slender style and a small stigma.
- **Fruit**: The fruit is a small berry that turns dark purple or black upon ripening.

Phytochemical Profile :

The aerial portions, particularly the stems of *Cissus quadrangularis*, contain several important primary and secondary metabolites. Extracts from the plant have revealed the presence of key secondary metabolites, including alkaloids, flavones, flavonoids, saponins, phytosterols, steroids, stilbenes, triterpenoids, tannins, carotene, cardiac glycosides, and vitamins, especially vitamin C.[4,5].

Cissus quadrangularis Linn.(Family: Vitaceae), commonly known as Hadjod in Hindi, is an ancient medicinal plant. Notably, triterpene δ-amyrin acetate (1), the aliphatic acid hexadecanoic acid (3), and the stilbeneglucoside trans-resveratrol-3-O-glucoside (9) were isolated for the first time from its stems.

Previously reported compounds include δ-amyrone (2), δ-amyrin (4), β-sitosterol (5), kaempferol (6), quercetin (7), and resveratrol (8)(6).

Quantitative chemical tests have confirmed the presence of carbohydrates, proteins, amino acids, phytosterols, flavonoids, tannins and phenolic compounds, gum mucilage, and saponins. The active constituents such as phytosterols, flavonoids, and triterpenoids in the stems of *Cissus quadrangularis* are believed to be responsible for its pharmacological activities.(7).

Traditional Uses:

Anti microbial activity:

The antibacterial activity of *Cissus quadrangularis* extracts was evaluated using three types: aqueous, N-Butanol, and acetone. The N-Butanol extract exhibited the strongest antibacterial activity, with *Arsenophonusnausoniae* showing an inhibition of 18.1, *Salmonella entericatyphi* at 17.1, and *Clostridium pneumoniae* at 16.1. The aqueous extract demonstrated moderate activity, with *Arsenophonusnausoniae* at 7.1, *Salmonella entericatyphi* at 7.8, and *Clostridium pneumoniae* at 7.9. In contrast, the acetone extract showed no antibacterial activity against any of the tested bacteria. Overall, the N-Butanol extract proved to be the most effective, while the acetone extract was ineffective(8).

Bone healing activity:

Cissus quadrangularis (Harjor, family *Vitaceae*) has been known for its bone healing properties for many centuries; it has been prescribed by the bone setters in the crude form both external as well as internal as decoctions. It has been found to be rich in Vitamin C.

It is also used as a diet in some parts of India and Sri Lanka. It is a succulent of family *Vitaceae* commonly found throughout hotter part of India. It can be cultivated in the plains coastal areas jungle and wasteland up to 500 m elevation. Plant flowers in June and December. Plant material occurs as pieces of varying lengths stem quadrangular 4 wing internodes. The surface is smooth, glabrous, and buff-coloured with greenish tinge. The angular portion is reddish-brown, no taste, and no odour. The whole plant including all parts stem leaves roots is documented to possess medicinal properties.

The roots and stems are most useful for healing of fracture of bones. The stem is bitter; it is given internally and applied topically in broken bones used in the complaint of back and spine. The plant has been documented in Ayurveda for the treatment of osteoarthritis, osteoporosis rheumatoid arthritis.

The plant has other important medicinal properties; it is useful in asthma, burns, and wound bite of poisonous insect.The plant is useful in helminthiasis, anorexia, dyspepsia, colic, flatulence, skin disease, leprosy, hemorrhage convulsions, eye diseases, piles, and anemia(9).

A study was undertaken to evaluate the effect of methanolic extract of Cissus quadrangularis Linn (CQ) on the healing process of experimentally fractured radius-ulna of dog. CQ treated animals revealed faster initiation of healing process than the control animals on radiological and histopathological examinations. The treated group also revealed a decrease in serum calcium level to a greater extent than the control group. Healing was almost complete on 21 st day of fracture in the treated animals and remained incomplete in the control animals(10).

Individual or combination of alcoholic extracts of Cissus quadrangularis, Cryptolepisbuchanani, and Sardinellalongiceps enhance the bone healing process in the tested animals due to the presence of different phytochemicals. These phytochemicals raise the level of serum calcium which led to speed up the bone healing and bone strength. Moreover, the combination of alcoholic extracts of natural compounds considerably reduces the time period of bone healing in the experimental rats as similar to that of standard drug. Thus, Cissus quadrangularis, Cryptolepisbuchanani, and Sardinellalongiceps are promising agents for the management of bone healing by restoring the calcium without inducing side effects(11).

Analgesic and Anti-Inflammatory Activity :

Theethanolicextractof cissus quadrangularis in albino ratsafter oral administration significantly reduced swelling caused by carrageenan within 1 to 5 hours at all tested doses. In terms of analgesic properties, the extract notably decreased pain in the acetic acid-induced writhing and formalin tests, indicating both central and peripheral effects(12).

Anti-Diabetic Activity:

The ethanolic extract of *Cissus quadrangularis* has demonstrated the ability to prevent diabetic nephropathy in rats with high-fat diet/streptozotocin-induced diabetes. It regularizes insulin resistance, creatinine levels, and lipid profiles, restores albuminuria, creatinine clearance, and glomerular filtration rate, and regulates SIRT1 and DNMT1 expression affected by a high-fat diet. The extract shows protective effects against renal inflammation, oxidative damage, and renal fibrosis by repressing TGFβ, col1/3, and Smad2/3 expression. Additionally, the ethanolic extract of the leaves exhibits antihyperglycemic activity, significantly reducing serum glucose levels and preventing weight loss in alloxan-induced diabetic rats.(13).

Conclusion

Cissus quadrangularis, a perennial climber from the Vitaceae family, has garnered significant attention due to its traditional medicinal uses and emerging pharmacological properties. Its diverse phytochemical composition, including flavonoids, tannins, and alkaloids, underpins its potential therapeutic applications.

Research highlights its efficacy in promoting bone health, as evidenced by its historical use in fracture healing and recent studies demonstrating accelerated bone regeneration in animal models. Additionally, its anti-inflammatory and analgesic properties suggest its utility in managing pain and swelling, making it a valuable candidate for treating inflammatory conditions.

Emerging data also point to the plant's anti-diabetic effects, showcasing its ability to regulate glucose levels and improve metabolic health in diabetic models. This positions Cissus quadrangularis as a promising natural remedy in managing chronic conditions, aligning with the growing interest in herbal medicine.

In summary, the integration of Cissus quadrangularis into modern medical practices could enhance treatment options for various health issues, particularly in bone healing, inflammation, and metabolic disorders. Future research should focus on clinical trials to further elucidate its efficacy and safety in human populations, paving the way for its acceptance in conventional medicine.

References:

1. High Demand for Medicinal Plants in India. Available online: https://www.ibef.org/blogs/high-demand-for-medicinal-plantsin-india (accessed on 7 June 2021).

2. Robert, G.W.; Qing-feng, W.; Yong, W.; You-hao, G. A Taxonomic Investigation of Variation within Cissus quadrangularis L. (Vitaceae) in Kenya. Wuhan Univ. J. Nat. Sci. 2001, 6, 715–724. [CrossRef]

3.Cissusquadrangularis.Availableonline:https://en.wikipedia.org/wiki/Cissus_quadrangularis (accessed on 7 June 2021).

4. Joseph, B.; George, J. Cissus quadrangularis in the Treatment of Osteoporosis. WJPR 2013, 2, 596–605.

5. Prabhavathi, R.M.; Prasad, M.P.; Jayaramu, M. Studies on Qualitative and Quantitative Phytochemical Analysis of Cissus Quadrangularis. Adv. Appl. Sci. Res. 2016, 7, 11–17.

6. Phytochemical Studies on Cissus quadrangularis Linn. Achal Thakur1 *, VandanaJain1 , L. Hingorani2 and K.S. Laddha1 Pharmacognosy Research [Phcog Res.] Vol 1, Issue 4, Jul-Aug, 2009 Page 213-215

7.PHARMACOGNOSTICAL&PHYTO-CHEMICAL INVESTIGATION OF CISSUS QUADRANGULARIS LINN. STEM Anuj K. Srivastava1 *, PriyankaSrivastava1 , B. R. Behera2 , A. K. Shrivastava3 Publication Ref No.: IJPRD/2011/PUB/ARTI/VOV-3/ISSUE-1/MARCH/020 ISSN 0974 – 9446

8. EVALUATION OF ANTIMICROBIAL ACTIVITY OF MEDICINAL PLANTS AND PHYTOCHEMICAL ANALYSIS OF CISSUS QUADRANGULARIS L K. Ramar1* and V. Ayyadurai2 World Journal of Pharmaceutical Research SJIF Impact Factor 5.990 Volume 4, Issue 5, 2484-2494. Research Article ISSN 2277– 7105

9.Medicinal plants and bone healing,Vibha SinghNatl J Maxillofac Surg. 2017 Jan-Jun; 8(1): 4–11.doi: 10.4103/0975-5950.208972

10. EFFECT OF ClSSUS QUADRANGULAR/S IN ACCELERATING HEALING PROCESS OF EXPERIMENTALLY FRACTURED RADIUS-ULNA OF DOG: A PRELIMINARY STUDY D.K. DEKA, L.C. LAHON, J. SAIKIA** A. MUKIT***Indian Journal of Pharmacology 1994; 26: 44 - 45

11. Evaluation of bone healing activity of Cissus quadrangularis (Linn), Cryptolepisbuchanani, and Sardinellalongiceps in Wistar rats Somasundaram Ramachandran1*, Laith Fadhil1 , Chandravadivelu Gopi2 , Masa Amala1 and MagharlaDasarathaDhanarajuRamachandran et al. Beni-Suef University Journal of Basic and Applied Sciences (2021) 10:30

12. Analgesic , anti-inflammatory and antipyretic activity of Cissus quadrangularisPriyanka Vijay et al, /J. Pharm. Sci. & Res. Vol.2(1), 2010, 64-71

13. Chaudhari RL, Patil PS, Chaudhari RY, Bhangale JO.Antihyperglycaemic activity of ethanolic extract of cissus quadrangularis (l.) Leaves in alloxan induced diabetic rats. Journal of Applied Pharmaceutical Science. 2013;3(01):73-7.