Indian Journal of Agriculture and Allied Sciences
A Refereed Research Journal

ISSN 2395-1109
Volume: 2, No.: 1, Year: 2016

Received: 13.01.2016, Accepted: 06.03.2016

Cissus quadrangularis Linn. (*Asthishrinkhala*): VALIDATION OF THERAPEUTIC EFFICACY THROUGH REVERSE PHARMACOLOGY

Awanish Pandey[1], Gyan Chand Kumar Morya[2], Hari Shanker Mishra[3] and R.B.Yadav[4]
[1]&[2] M.D. Scholars, [3]Lecture [4]Reader, P.G. Department of Dravyaguna, L.H.S.P.G.Ayurveda College, Pilibhit, U.P. Mob.: 09452674777, E-mail: avi24hr4u@gmail.com, Corresponding Author: Awanish Pandey

Abstract: *In Ayurveda, diminution of dhatu has been considered as the most important cause of vitiation / aggrevation vata dosha. Diminution of Asthidhatu causes loss of hair, nails, beard, moustache and teeth, fatigue and laxity of joints. Asthi dhatu kshaya leads to probability of bone fracture, osteoporosis and joint disorders. Asthishosh is feature of asthigata vata. In Ayurveda, there are many herbs that accelerate the fracture healing and prevent senile bone decay. Cissus quadrangularis Linn.,Vitaceae (Asthishrinkala) is reputed herb in traditional system of Indian medicine. The osteogenic potency of this plant is favourable in the treatment of bone fracture and also in delay and prevention of osteoporosis. Almost all parts like root, stem, leaf are used medicinally. C. Quadrangularis Linn. possess antioxidant, antimicrobial activity and is routinely used to accelerate the process of bone fracture healing, prevents osteoclastic activity, relieves pain and inflammation, increase bone mineral density, rapidly increase bone tensile strength which leads to faster recovery. The plant is considered as a versatile medicinal plant in both Ayurvedic and modern drug development areas for its valuable medicinal uses.*

Keywords: *Asthidhatu kshaya, Asthishrinkhala, Anti-inflammatory, Anti-oxidant, Fracture healing properties, Osteoclastic activity.*

Introduction: *Asthishrinkhala* (*Cissus quadrangularis Linn.* or *Vitis quadrangularis*, Family-Vitaceae) commonly known as *"Hadhjod"* has been used in *Ayurveda* since the time of *Shodhal*.[1] Plant is beneficial for healing of the fracture of bone and useful in treatment of Osteoarthritis, Rheumatoid arthritis and osteoporosis. It is a common perennial climber distributed throughout India, particularly in tropical regions.

According Ayurveda, *vata* is aggrevated due to diminution of *dhatu*. Diminution of *Asthi* leads to is falling of hair, nails, beard, moustache and teeth, fatigue and laxity of joints (*Kesha, loma, nakha, shramashu, dwij prapatanam, Sandhi saithilya)*[2]. Sequence of *dhatu* formation described by Acharya Charaka states that previous *dhatu* nourishes the later in the series of *saptadhatu* viz. *rasa, rakta, mansa, meda, asthi, majja, shukra*.[3] From birth to death and right from the moment of conception, into the extreme old age, the human body undergoes considerable changes in shape, size and composition.

Sanskrit Names: *Granthiman, Asthisamhari, Vajravalli, Asthishrinkhala, Kandavalli, Vajrangi, Asthisamyojaka* [4]

Etymology: *"Asthibhagna rogam samharyati yojyati"*[4]

***Asthishrinkhala* in Classics**

- *Guduchyadi varga–Bhavaprakash nighantu* [4].
- *Asthisandhaniya-P.V.Sharma* [5]

Image 1:*Cissus quadrangularis* Linn.

Pharmacological Properties

Classical (Rasapanchaka)[5]

Rasa- Madhura

Guna -Laghu, Ruksha

Vipaka- Madhura

Virya – Ushna

- *Kapha-vata shamak, pitta vardhak*

Classical uses: *Dipana* (appetiser), *Pachaka* (digestant), *Raktashodhaka* (blood purifier), *Raktastambhaka* (arrests bleeding), *Bhagna-sandhanak* (bone fracture healing), *Krimighna* (anthelmintic), *Arshoghna* (cure piles), *Akshirogajit* (used in ophthalmic disease), v*rishya* (aphrodisiac) [5].

अस्थिसंहारकः प्रोक्तो वातश्लेष्महरोऽस्थियुक्।
उष्णः सरः कृमिघ्नश्चदुर्नामघ्नोऽक्षिरोगजित्
रूक्षः स्वादुर्लघुर्वृष्यः पाचनः पित्तलः स्मृतः॥ [4]

- *Asthisamhara* along with meat or other items cures fracture and other severe types of *vata vyadhi* (*Urustambha*) [6]
- Stem of *Asthisamhara* devoid of bark and one half dehusked black *gram* (*Phaseolus mungo* Linn., Fabaceae) are pounded and then cooked in *sesamum* oil. This *vataka* alleviates *vata.* [4]

Classical Formulations

1. ***Asthisamharaka Swaras:*** Plant stem juice could be used for *Nasya* (nasal drop purpose) in Epistaxis, for treating worm infestation *vidanga churna* (Powder of *Embelia ribes* Burm.f.) is added and taken twice daily[7].

2. ***Asthisamharaka Lepa*****:** The leaves crushed (Paste of leaves) and applies to arrest bleeding in fresh wound due to bone fracture [7].

3. ***Asthisamharaka Churna*****:** *Asthishrinkhala, Arjuna (Terminalia arjuna Roxb.), Godhuma*(*Triticum sativum* Lam.) *Laksha* - all ingredients taken in equal quantity in fine powder form mixed with *ghrita* taken along with milk in *Asthibhanga chikitsa* [9].

4. ***Asthisamharaka Taila*****:** Oil processed with whole plant for local application in treatment of Rheumatoid arthritis and osteoarthritis [4].

Phytochemistry: The plant contains various constituents such as flavanoides, triterpenoids, vitamin 'C', stilbene derivatives and many others, e.g. resveratrol, piceatannol, pallidol perthenocissin and phytosterols. Ascorbic acid triterpene, β- sitosterol, ketosteroid, two asymmetrical tetracyclic triterpenoids and calcium were identified as major constituents of the plant [9].

It contains high amount of carotene-A, anabolic steroidal substances, mucopoly-sacchrides. The plant contains ascorbic acid, 479 mg and carotene 267 mg per 100 gm freshly prepared paste in addition to calcium oxalate. The root powder is rich source of mineral elements (mg/100 g dry matter); potassium 67.5; calcium 39.5, zinc 3.0, sodium 22.5, Iron 7.5, lead 3.5, cadmium 0.25, copper 0.5 and magnesium 1.15. Air dried plant contain moisture 13.1, protein 12.8, wax 1.0, fiber 15.6, carbohydrate 36.6, mucilage and pectin 1.2 and ash 18.2%.

Pharmacological Activity: Anti-inflammatory, Anti-osteoporotic, Anti-haemorrhoidal, Anti-ulcerative, Anti-oxidant and free radical scavenging properties, Anti microbial, Anti bacterial, bone healing activity, Parasympathetic activity [9].

Anti inflammatory and Analgesic Properties: Flavonoids have inhibitory effect on the inflammatory process. They inhibit lipo-oxygenase, especially luteolin**.** Anti-inflammatory activity of β- sitosterol was demonstrated to have an inhibitory effect on oedema induced by both carrageens and arachidonic acid. It is suggested that *C. quadrangularisis* is dual inhibitor of arachidonic acid metabolism [9].

Anti Osteoporotic Activity: *C. quadrangularisis* has been reported in *Ayurveda* for its anti osteoporotic activity. Phyto-estrogen rich fraction (IND- HE) from the aerial parts of plant shows this activity. Phytoestrogen steroids isolated show influence on early regeneration and quick mineralization of bone. Ethanolic and petroleum ether extract of *C. quadrangularisis* shows prominent effect. Various studies confirm anti-osteoporotic activity. Phytoestrogen rich fraction (IND- HE) of *C. quadrangularisis* increased blood calcium level, Vit D3, serum estrogen, bone mineral density and bone mineral content. There is significant increase in bone thickness, bone density and bone hardness. It also significantly inhibits the anti anabolic effect and exerts some beneficial effect on recovery of bone mineral density. The ethanolic extract of *C. quadrangularisis* shows definite anti-osteoporotic effect [9].

Bone Healing Activity: The anabolic steroid principle from *C. quadrangularis* showed marked influenced on rate of fracture healing by influencing early regeneration of all connective tissue involved in the healing and quicker mineralization of callus [9]. Its systemic use in rats caused complete restoration of normal composition of bone after four weeks of fracture. All events namely fibroblastic phase (1st week),

collagen (2nd week) and osteochondroital phase (3rd week and 4th week) were hastened about 10-14 days in treatment group. This hastening in the healing was attributed to stimulation of all the cells of mesenchyme origin mainly fibroblast, the chondroblast and osteoblast by *C. quardrangularis*. The plant contains vitamins and steroids, which are found to have specific effect on bone fracture healing. Various studies concluded that C. *quadrangularisis* cause less amount of tissue reaction in the fracture region leading to optimum decalcification in early stage with minimum of callus formation; hence deposit of calcium was just enough to joint two broken segments of bones so that its remodelling takes much faster. Plant builds up the chemical composition of fractured bone namely muco-polysacchrides collagen, calcium, phosphorus and other component. Mucopolysacchrides play an important role in healing by supplying raw material at the site for repairing tissue. The *C.quadrangularis* extract may regulate osteoblastic activity by enhancing MAPK (mitogen activated protein kinase)-dependent alkaline phosphatase activity, preferentially via p38 MAPK pathway. *C.quadrangularis* treatment resulted in early calcification and remodelling phenomenon, as calcium level and the tensile strength of newly formed bone were rapidly restored to normal level [10].

Anti Ulcer Activity: Methanol extract showed significant antiulcer activity in experimentally induced ulcer in rat model by decreasing gastric secretions and by enhancing glycoprotein levels. Methanol extract produced healing effect on aspirin induced gastric mucosal damage in rats through its anti-oxidative mechanism. Investigations suggested that *C.quadrangularis* not only strengthens mucosal resistance against ulcerogens but also promotes healing by inducing cellular proliferation [9].

Anti Microbial and Anti Bacterial Activity: Methanol extract (90%) and dichloromethane extract of stems possess antibacterial activity against *S. aureus*, *E. coli*, and *P. aeruginosa* and mutagenicity against *Salmonella microsome*. Antimicrobial activity has also been reported from stem and root extract. The alcoholic extract of aerial part was found to possess anti protozoal activity against *Entamoeba histolytica* [11].

Antioxidant and Free Radical Scavenging Properties: Methanol extract of *C. quadrangularis* exhibits strong antioxidant and free radical scavenging activity *in vitro* and *in vivo* systems mainly due to the presence of β-carotene [10].

Central Nervous System Activity: The root extract possess central nervous system depressant activity indicated by decrease in exploratory behaviour. Methanol extract of root contains saponins which show potent sedative activity and also inhibit spontaneous motor activity in mice [11].

Conclusion: *C.quadrangularis* Linn. has therapeutic efficacy and is known to possess antioxidant, antimicrobial activity and are routinely used to accelerate the process of bone fracture healing [12,13], prevent osteo-clastogenesis [14], relieve pain and inflammation, [15] increase bone mineral density (BMD) [15], rapidly increase bone tensile strength which leads to faster recovery [12]. The plant is considered as a versatile medicinal plant in both *Ayurvedic* and modern drug development areas for its valuable medicinal uses.

References

1. Tripathi Indradev, Pandey Ganga Sahay. (2003). *Gada Nigrah vidyotini Hindivyakhya*, part 2, Chaukhambha Sanskrit sansthan, Varanasi, p. 541.
2. Pandey Kashi Nath & Chaturvedi Gorakh Nath. (2009). *Charak Samhita of Agnivesh* (Ed), Vidyotani Hindi Commentary, (CS.Su.17/67) Chaukhamba Bharati Academy,Varanasi, India.
3. Pandey Kashi Nath & Chaturvedi Gorakh Nath. (2009). *Charak Samhita of Agnivesh* (Ed), Vidyotani Hindi Commentary, (CS.Ci.15/16-17) Chaukhamba Bharati Academy,Varanasi, India.
4. Bhav Mishra. (2013). *Bhava Prakash Nignantu*, Hindi Commentary Chuneker K. C., Chaukhambha Bharti Academy (Guduchyadi verga) p. 403-404.
5. Sharma, P.V. (2006). *Dravaygun vigyanam*, vol-2, Chaukhambha Bharti Academy, p. 631.
6. Tripathi Indradev, Pandey Ganga Sahay. (2003). *Gada Nigrah vidyotini* Hindi vyakhya, part 2, Chaukhambha Sanskrit sansthan, Varanasi, p. 541.
7. Dev, N. (1970). *Ayurvediya Dravyagena Vigyanam*, Maharashtra Ayurveda samshodhan mandalam, p.177-181.
8. Shastri, A. (1969). *Bhagnarog chikitsa*, Chukhamba publication, 49(14): 602.
9. Atram Seema. (2015). Pharmacological review of Cissus quadrangularis Linn Asthishrinkhala), *International Ayurvedic Medical Journal* ISSN: 2320 5091, page no. 1233-1239.
10. Duenpim Parisuthiman- Weerachai Singhatanadgit. Thaweephol Dechatiwongese. (2009). Sitthichai Koontongkaew-Cissus quadrangularis extract enhances biomineralization through up regulation of

MAPK-dependent alkaline phosphatise activity in osteoblasts, In Vitro cell Dev. *Biol.-Anima* 45:154-200.

11. Unnati Shah. (2011). Cissus quadrangularis: Phytochemicals, Traditional uses and Pharmacological Activities-a Review, *International journal of pharmacy and pharmaceutical sciences* ISSN 0975-1491 Vol 3, suppl 4, page.41-44.
12. D.Parisuthiman, W.Singhatanadgit. (2009). In Vitro Cellular & Development Biology, *Animal*, 45:194-200.
13. Jagat R Kanwar, Rasika M. Samarasinghe and Rupinder K Kanwar(2011). Cissus quadrangularis inhibits IL-1β induced inflammatory response on Chondrocytes and alleviates bone deterioration in osteotomized rats via P38 MAPK signalling *Journal of cellular biochemistry*,112:1035-1045.
14. Bhagath potu, Mudanna Rao, Gopalan Kutty Nampurath, Chamallamudi Mallikarjuna Rao, Keerthana Prasad, Soubhagya R Nayak. (2009). Evidence based assessment of antiosteoporotic activity of Petroleum-ether extract of Cissus quadrangularis Linn: On ovariectomy induced osteoporosis. *Upsala journal of medical sciences*,114:140-148.
15. Srisook K Palachot, M.Mongkol, N.Srisook, Sarapusit. S. (2011). Anti inflammatory effect of ethyl acetate extract from Cissus quadrangularis Linn. By involved with induction of hemeoxygenase-1 and suppression of NF-KB activation. *Journal of Ethanopharmacology*, 133:1008-1014