

A CRITICAL ANALYSIS ON OSTEOGENIC ACTIVITY OF CISSUS QUADRANGULARIS (ASTHISRINKHALA)

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ABSTRACT

Cissus Quadrangularis (CQ) known as *Asthisamharaka/ Asthisrinkhala* in Sanskrit, means that which saves the bone from their destruction. The significance of *Cissus quadrangularis* has been mentioned in almost all scriptures of *Ayurveda* especially in the context of bony ailments. Since then it has been extensively used as bone setters for both external application (fracture management) and internal medication (to be taken with milk in case of osteoporosis). This study highlights the therapeutic and phytochemical aspects of CQ regarding its osteogenic activity. CQ is a perennial climber and has been reported to possess bone fracture healing, anti-osteoporotic, anti-bacterial, anti-fungal, antioxidant, anti-hemorrhoidal & analgesic activities. This article shows *Asthisrinkhala* as a biological factor of bone healing, thus accelerating the healing process as an adjuvant therapy.

Keywords: *Cissus quadrangularis* (CQ), *Asthisamharaka/ Asthisrinkhala*, therapeutic and phytochemical aspects

INTRODUCTION

Cissus quadrangularis / Vitis quadranglaris is a commonly used medicinal plant in the field of herbal medicine. It is well known as 'Hadjod' which belongs to the family of Vitaceae. It has been recommended in *Ayurveda* as anthelmintic, dyspeptic, digestive, tonic, analgesic, in eye and ear diseases and asthma. Some other reports of CQ justifies its effectiveness in the management of obesity and complications associated with metabolic disorders¹. Various studies show that, CQ will act as an effective osteogenic agent which aids in bone healing process and takes less healing time compared with the controls.

Osteogenesis / ossification in bone remodeling is a process of laying down new bone material by cells called osteoblasts. It is synonymous with bone tissue formation. There are two processes resulting in the formation of normal, healthy bone tissue. Intramembraneous ossification is the direct laying down of bone into the primitive connective tissue (mesenchyma), while endochondral ossification involves cartilage as a precursor. In fracture healing, Enchondral osteogenesis is the most commonly occurring process, for example in fractures of long bones treated by plaster of paris. In case of fractures treated by open reduction and internal fixation with metal plates, screws, pins,

rods and nails may heal by intramembranous osteogenesis.²

The relevance of osteogenic activity comes in case of osteoporosis. It is a common disease in elderly and is now recognized as the major contributory factor for increase in fragility fractures. The condition is characterized by loss of trabecular bone mass as well as thinning of cortical bone. Low bone density in the elderly can result from either low peak bone mass or accelerated bone loss or a combination of two. The leading cause of osteoporosis is the lack of certain hormones, particularly oestrogen in women and androgen in men. The imbalance in the activities of osteoblasts and osteoclasts cells lead to osteoporosis in postmenopausal women. In osteoporosis the bones become deteriorate due to calcium deficiency. In menopause, the hormonal changes affect the ability of body to maintain calcium levels resulting in high mineral loss from the bone. Postmenopausal women are at high risk to osteoporosis due to the drop of estrogen and that may reduce the bone density. Treatment focuses for reducing the loss of minerals, thereby preventing bone fractures and controlling pain associated with the disease.³

CQ contains vitamins and steroids, which helps for fracture healing and osteoporosis. The anabolic steroidal principles of CQ showed a noticeable effect in the rate of fracture healing by influencing early regeneration of all connective tissues involved in healing and quicker mineralization of callus. Thus, it helps in building up the density of bone too.

Classification⁴

Kingdom – plantae, Division – mangoliophyta, Class – mangoliopsida, Order – vitalis, Family – vitaceae, Genus – *Cissus*, Species – *quadrangularis*

Table 1: Clinical uses of each part of CQ¹¹

Sl. No:	Part used	Effect
1	Stem/leaves/young shoots	Gastritis, bone fractures, skin infections, constipation, eye diseases, haemorrhoids, anemia, asthma, irregular menstruation, burns & wounds
2	Powder	Hemorrhoids, bowel infections
3	Stem paste	Asthma, indigestion

Osteogenic activity

CQ commonly known as bone setter, generally referred as *asthisringala*, *asthisamharaka*, *ashtisamdhani* in Sanskrit & Hadjod in Hindi because of its ability to join bones. The main constituent of CQ is a phytochemical steroid. Studies on fracture healing suggest that this unidentified anabolic steroid may act on osteogenic receptors of bone. Efficiency of CQ in early ossification and remodeling of bones have been reported and it has been observed that CQ acts by stimulation of metabolism & increased uptake of the calcium, sulphur, strontium minerals by osteoblasts in fracture healing.^{5,6}

Various studies show that CQ causes less amount of tissue reaction in the fractured region leading to optimum decalcification in the early stage. Hence deposition of calcium was more enough to join the two broken segments of bones and quick remodeling with CQ as compared with controls. This early completion of calcification process and earlier remodeling phenomenon lead to early recovery.⁷The mucopolysaccharids present in CQ plays a major role in healing by supplying raw material at the site of affected bone tissue.

Ayurvedic properties of the plant

Asthisamharaka is a medicinal plant which has been using in Ayurveda since the time of *Bhavprakash nighantu* written by *Acharya Bhavprakash* in 16th century. The plant is beneficial for healing the fractured bone. The plant also documented in *Ayurveda* for treatment of osteoarthritis, rheumatoid arthritis and osteoporosis.⁸

*Rasapanchaka*⁹

*Rasa – madhura, Guna – laghu, Vipaka – madhura, Veerya – ushna, Karma – kapha vatha samana*¹⁰, *rakthasthamhaka, bhagna sandhanakara, krimighna, arshoghna, akshirogajith, vrushya*

	(boiled in lime water)	
4	Root powder	Bone fractures both internally & externally as plasters.
5	Metabolic extract	Antiulcer & cytoprotective activity in indomethacin induced mucosal injury
6	Stem juice	Scurvy, irregular menstruation, otorrhoea (as ear drops), epistaxis (as nasal drops)

Dietary use

Leaves & stem should take with curry, use boiled & fried for preparing foods under dietetics.

Classical formulations

1. *Asthisrinkhala Vataka*¹²: It is a multi-drug preparation, *Asthisrinkhala* 1 part with black gram flour 1part. Indication: joint disorders

2. *Asthisamharaka Swarasa*¹³ Plant stem juice could be used for *Nasya* (nasal drop purpose) in treatment. Indication: Epistaxis, for treating worm infestation add *vidanga churna* take twice daily.

3. *Asthisamharaka lepa*¹³ The crushed leaf can apply on wound to arrest bleeding.

Indication: Fresh wound cuts. It helps to stop bleeding, especially in wounds due to bone fracture.

4. *Asthisamharaka churna*¹⁴ *Asthisrinkhala*, *arjuna*, *godhuma*, *laksha* all ingredients should be finely powdered and mix equally together with *ghrita* and take along with milk.

Indication: *Asthibhanga chikitsa*

5. *Asthisamharaka taila*¹² Oil processed with whole plant for local application.

Indication: It is recommended in treatment of Rheumatoid arthritis and osteoarthritis.

6. *Lakshaguggulu*¹⁴ *Laksha*, *asthisamhara*, *kakubha*, *aswagandha*, *nagabala*- each 1 part and *guggulu* 5 part made in *gulika* form.

Indication: bone & joint disorders

DISCUSSION

Majority of population in the world depends on herbal medicines for basic health care needs. The reasons are culturally accepted medicines, cheaper as compared to other systems and efficacious in many of the circumstances. Many studies revealed that the use of CQ results in complete restoration of normal composition of bone compared with the control groups. Radiological and hematological investigations conducted also shows noticeable changes. Post management investigations shows complete bridging of the fracture with extensive bony deposition and periosteal reaction. Also, the whole plant can be used for various therapeutic actions as different formulations. *Ayurveda*, the traditional system of Indian medicine uses CQ as a single

drug and also in different medicinal preparations. As explained in *Ayurveda*, *Madhura rasa* of the drug which is *sthairyakara*, *sandhanakara* and *sarvadhathu vivardhana* might acted upon each *dhathu* (*dhatwagani*) level there by strengthening the base for quality *asthidhathu nirmana* to have *sandhanakara* property; while *kashaya rasa*, *laghu rooksha guna* have *soshana*, *lekhana*, *ropana* properties thus act as *shodhahara* & *sandhana* there by stopping haemorrhage, absorbing haematoma and promotes healing process, thus ultimately unites the fractured bone. *Madhura vipaka* & *ushna veerya* of *asthisringala* leads to *samana* (alleviation) of *vathadosha*. According to *Ashraya ashrayibhava* described by *Vagbhada*, *shamana* of *vathadosha* promotes *asthivridhi*. *Madhura rasa*, *madhura vipaka*, *saraguna* & *rakthashodhana* property of *asthisringala*^{10,15} might act on local circulation with increasing cellularity and vascularity thus enhancing the process of osteogenesis. CQ has been reported in *Ayurveda* for its anti-osteoporotic activity. The phytoestrogen rich fraction from the aerial part of plant shows its activity. Plant contains phytoestrogen steroids which show influence on early regeneration and quick mineralization of bone. The ethanolic and petroleum ether extract of CQ shows increased blood calcium level, vitamin D3, serum estrogen, bone mineral density and bone mineral content. There is significant increase in bone thickness, bone density and bone hardness, also helps on the recovery of bone mineral density. The ethanolic extract of CQ shows definite anti-osteoporotic effect.

CONCLUSION

The uses of herbal medicines are widely accepted all over the world for both mental & physical ailments. *Cissus quadrangularis* is well known for its therapeutic actions like antimicrobial activity, antioxidant activity and are routinely used to accelerate the process of bone fracture healing and to recover osteoporosis. This is considered as a versatile medicinal plant in both ayurvedic and modern drug development areas. It is a very good source of vitamins and minerals which aids in bone healing process and act as an anti-osteoporotic agent. CQ can act as one of the best

drugs in general practice in fracture patients because it is easily available, cost effective and quick bone restoration ability.

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Source of Support: Nil

Conflict of Interest: None Declared

How to cite this URL: Aswany K. R. et al: A Critical Analysis On Osteogenic Activity Of *Cissus Quadrangularis* (Asthisrinkhala). International Ayurvedic Medical Journal {online} 2020 {cited May, 2020} Available from: http://www.iamj.in/posts/images/upload/3587_3590.pdf