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

Aswany K. R.1, Sureshkumar C.2, Deepthi C. V.3

1Final year PG scholar, 2MD (Ayu), Phd, Professor, 3MS (Ayu), Associate Professor. 
Department of Shalyatantra, Pankajakasthuri Ayurveda Medical College & PG Centre, Kattakada, Trivandrum, Kerala, India

Email: aswanychithira92@gmail.com

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, antibacterial, 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 quadrangularis 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 lying 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 steroildal 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

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<th>Table 1: Clinical uses of each part of CQ¹¹</th>
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Osteogenic activity
CQ commonly known as bone setter, generally referred as asthisringala, asthisamharaka, asthisamdhani 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.⁷ The 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 Bhavprakasha 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

Rasapanchaka⁹
Rasa – madhura, Guna – laghu, Vipaka – madhura, Veerya – ushna, Karma – kapha vatha samana¹⁰, rakthasthamhaka, bhagna sandhanakara, krimighna, arshogha, akshirogajith, vrushya

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

Classical formulations
1. Asthishrinkhala Vataka<sup>12</sup>: It is a multi-drug preparation, Asthishrinkhala 1 part with black gram flour 1 part. Indication: joint disorders
2. Asthisamharaka Swarasa<sup>13</sup> 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<sup>14</sup> 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<sup>14</sup> Asthishrinkhala, 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<sup>12</sup> Oil processed with whole plant for local application.
   Indication: It is recommended in treatment of Rheumatoid arthritis and osteoarthritis.
6. Lakshaguggulu<sup>14</sup> 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 sarvadhatu vivardhana might acted upon each dhatu (dhatvagni) level there by strengthening the base for quality asthidhatu nirmana to have sandhanakara property; while kashaya rasa, laghu rooksha guna have soshana, lekhana, ropana properties thus act as shodahara & sandha there by stopping haemorrhage, absorbing haematoma and promotes healing process, thus ultimately unites the fractured bone. Madhura vipaka & usha veerya of asthisringala leads to samana(alleviation) of vathadosha. According to Ashraya ashrayibhava described by Vagbhada, shamana of vathadosha promotes asthivridhii. Madhura rasa, madhura vipaka, saraguna & rakhashodhana property of asthisringala<sup>10,15</sup><sup>10</sup> 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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