

## Asthisanharak (*Cissus Quadrangularis* Linn.), an Ayurvedic Herb in Modern Perspective: A Review

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| Received: 07.05.2019 | Accepted: 18.05.2019 | Published: 30.05.2019

DOI:10.21276/sijtc.2019.2.3.2

### Abstract

Medicinal plants have been used in virtually all cultures as a source of medicine. *Asthisanharak* (pacification of bones) [*Cissus quadrangularis* Linn.] belonging to Family Vitaceae is also popularly known as *hadjod* (bone setter) in Hindi. It is a perennial climber widely used in Ayurveda, for *Pachana* (digestive aid), *Sara* (relieves constipation), *Athiyuk* (strengthening bones), *Vrishya* (Aphrodisiac), *Krumighna* (destroys worms), *Arshoghna* (cures piles), *Balya* (provides strength), *Amaghna* (Relieves ama – a product of indigestion and altered metabolism), *Kushthaghna* (cures skin disorders) activities. It possesses calcium oxalate,  $\beta$ -carotene, ascorbic acid,  $\beta$ -sitosterol and 3-ketosteroids, also flavonoids like quercetin, and kaempferol. The stem has two unsymmetrical tetracyclic triterpenoids, onocer-7-ene-3 $\alpha$ , 21 $\beta$ -diol and onocer-7-ene-3 $\beta$ , 21  $\alpha$ -diol, two steroidal principles I and II,  $\delta$ -amyrin,  $\delta$ -amyrone. It has been reported to have bone fracture healing, Antioxidant, Free radical scavenging, Anti-microbial, Anti-fungal, Anti-bacterial activity, Anti-fungal, Anti-viral activity, Anti-ulcer activity, Analgesic, anti-inflammatory and stimulatory activity, Anti-obesity activity, Anti-pyretic activity, Anti-haemorrhoidal activity, Anti-tumour and cytotoxic activity, Anti-helminthic activity and Gastro-protective activities etc. Considering its therapeutic values, a review has been done to compile information on Ayurvedic aspect of *Asthisanharak*. Moreover Ayurvedic references, the present paper also emphasizes on its pharmacognostical studies, phytochemical constituents and researches conducted on this plant for its clinical and pharmacological evaluation which would be worthwhile to explore its unique features.

**Keywords:** *Asthisanharak*, *Cissus quadrangularis*, bone healing, pharmacological, phyto-chemical.

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### INTRODUCTION

According to WHO 80% of world population depends on traditional system of medicine. Indian system of medicines like Ayurveda, Siddha, and Unani utilize large number of medicinal plants for the treatment of human diseases [1]. *Asthisanharak* (pacification of bones) (*Cissus quadrangularis* Linn.) belonging to Family Vitaceae is commonly known as Veldt Grape or Devil's Backbone. The plant is popularly called as *Asthisanharak* (saves the bones from their destruction) or *Asthisandhani* (heals the bone fractures) in Sanskrit and *Hodjod* (bone setter or bone healing) in Hindi. It is a succulent fleshy and cactus-like plant, a perennial climber usually found throughout the hotter parts of India. It can be cultivated in plains coastal areas, jungles and wastelands up to 500m elevation. Plant is propagated using cuttings. Plant flowers in the month of June-December [2]. Plant material occurs as pieces of varying lengths; stem quadrangular, 4-winged, internodes 4-15cm long and 1-2cm thick. The surface is smooth, glabrous, buff coloured with greenish tinge. In Ayurveda, it is widely

used for *Pachana* (digestive aid), *Sara* (relieves constipation), *Athiyuk* (strengthening bones), *Vrushya* (Aphrodisiac) and *Krumighna* (destroys worms), *Arshoghna* (cures piles), *Balya* (provides strength), *Amaghna* (Relieves ama - a product of indigestion and altered metabolism), *Kushthaghna* (cures skin disorders) activities. It has been recognized as a rich source of carotenoids, triterpenoids and ascorbic acid and has many therapeutic uses. The traditional usages of *Asthisanharak* are in regards to its supposed antiulcer properties, Anti-haemorrhoid properties, pain relieving properties and wound healing properties and in treatment of female disorders (menopause, libido, and menstrual disorders) and bone disorders (increasing bone mass or accelerating fracture healing rates). Its fresh stem and leaves are used for the treatment of haemorrhoids, menstrual disorders, scurvy and flatulence [3]. Leaves and young shoots are often taken with curry in Southern India. The young shoots of the plant are dried, powdered, burnt to ashes in a closed vessel in Chennai. These ashes are used in the management of dyspepsia, indigestion and certain

bowel complaints. Leaves and young shoots are also utilized as powerful alternatives in the gastro intestinal treatments. In otorrhoea Juice of stem is dropped into the ear and in epistaxis the same into the nose. It contains active constituents like phytosterol, mucopolysaccharides etc. in stem which are accountable for its therapeutic efficacy and known to have Anti-oxidant, Anti-inflammatory, Bone healing activities which are regularly used to hasten the process of bone fracture healing. Furthermore it has revealed many diverse pharmacological actions like Free radical scavenging, Anti-microbial, Anti-fungal, Antibacterial activity, Anti-fungal, Anti- viral activity, Anti-ulcer activity, Analgesic, anti-inflammatory and stimulatory activity, Anti-obesity activity, Anti-pyretic activity, Anti-haemorrhoidal activity, Anti-tumour and cytotoxic activity, Anti-helminthic activity and Gastro-protective activities. The present paper is an effort to highlight its Ayurvedic information, multiple pharmacological uses and medicinally active phytoconstituents and provide medicinal values of this plant to scientific communities. This review evaluates the rich heritage of traditional drug, 'Asthisanharak'.

#### Ayurvedic Aspect

**Synonyms:** *Asthisamhari, Vajravalli, Asthishrinkhala, Kandavalli, Vajrangi, Asthisamyojaka, Granthiman.*

#### Vernacular names: [4]

|          |  |
|----------|--|
| English  | : Edible stemmed vine, Adamant creeper, Bone setter        |
| Hindi    | : <i>Hadjod, Hadjora, Hadsarihari, Harsankari, Kandvel</i> |
| Bengali  | : <i>Har, Harbhanga, Hasjora, Horjora</i>                  |
| Gujarati | : <i>Chodhari, Hadsand, Hadsankal, Vedhari</i>             |
| Kanada   | : <i>Mangarahalli</i>                                      |
| Malyalam | : <i>Cannalamparanta, Peranta</i>                          |
| Marathi  | : <i>Horjora, Harsankar, Kandavel, Nalllar</i>             |
| Tamil    | : <i>Piranti, Vajravalli</i>                               |
| Telugu   | : <i>Nalleru, Nelleratiga, Vajravalli</i>                  |
| Punjabi  | : <i>Haddjor</i>   |
| Urdu     | : <i>Harjora, Hadsankal</i>                                |
| Oriya    | : <i>Hadavhanga</i>  |

#### Habit and Habitat

*Cissus quadrangularis* grows natively in hot, dry regions of India, such as the Deccan peninsula. It is also found on the lower slopes of the Western Ghats, and is widespread across drier areas of Arabia and Africa. *Cissus quadrangularis* is a herb, reaching a height of 1.5 m and has quadrangular-sectioned branches with internodes 8 to 10 cm long and 1.2 to 1.5 cm wide.

#### Raspanchak [4]

**Rasa:** *Madhura* (sweet), *Katu* (pungent)

**Virya :** *Ushna* (hot)

**Vipaka:** *Madhura* (sweet)

**Guna:** *Laghu* (lightness), *Ruksha* (dryness), *Sara* (mobility)

**Karma:** *Krimighna* (useful in Worm infestation), *Arshoghna* (cures Piles), *Deepana* (stimulates digestive power), *Vrishya* (Aphrodisiac), *balya* (provides strength).

#### Properties of Asthisanharak mentioned in various Ayurvedic classics:

##### **Bhava Prakash Nighantu- [5]**

*Varga - Guduchiyadivarga*

**Karma:** - *Krimighna* (useful in Worm infestation), *Arshoghna* (cures Piles), *Deepana* (stimulates digestive power), *Vrishya* (Aphrodisiac), *Balya* (provides strength).

##### **Kaiyadev Nighantu- [6]**

*Varga - Mishrakvarga*

**Karma-** *Krimighna* (useful in Worm infestation), *Arshoghna* (cures Piles), *Deepana* (stimulates digestive power), *Vrishya* (Aphrodisiac), *Balya* (provides strength), *Sara* (mobility)

##### **Nighantu Ratnakara- [7]**

**Karma-** *Arshoghna* (cures piles), *Agnideepana* (stimulates digestive power), *Kushthahar* (cures skin diseases), *Bhootopdravahar* (cures psychotic disorders).

##### **Chakradatta- [8]**

*Varga - Bhagnachikitsaadhyaya*

**Karma-** *Asthibhagnachikitsa* (in the treatment of bone fracture), *Sandhichyutchikitsa* (in the treatment of dislocation of joints).

#### Useful part: Stem

**Traditional Uses [9]:** It is used to cure diseases like *Asthibhagana* (dislocation of joints), *Agnimandhya* (digestive insufficiency), *Ajeerna* (indigestion), *Arsha* (Piles), *Krimi* (Worm infestation), *Vatarakta* (Gout), *Firanga* (syphilis), *Updanshya* (chancroid), *Raktasrava* (blood-letting), *Pradara* (menorrhagia).

**Therapeutic Uses [9]:** It is useful in the treatment of *Arsha* (Piles), *Asthibhagna* (Bone fracture), *Krimi* (Worm infestation), *Netraroga* (Diseases of the eye), *Shwasa* (Asthma), *Urustambha* (Stiffness in thigh muscles), and *Vrana* (Ulcer) .

**Important Formulations** – *Lakshadya guggulu, Srinkhala Ghana, Asthisamhara (Kanda), Asthisanghatika Yoga, Asthisamhara vatika, Astisanhara Arka, Asthisamhara tailam.*

**Some Classical formulations are as following**

- **Asthishrinkhala Vatak** [10]: Its multi drug preparation of *Asthishrinkhala* 1 part with black gram flour 1 part. Indication: The *vataka* is recommended in treatment of joint disorder.
- **Asthisamharaka Swaras** [11]: Plant stem juice could be used for *Nasya* (nasal drop purpose) in treatment 2 drops. Indication- Epistaxis, for treating worm infestation, add *Vidanga churna* take twice daily.
- **Asthisamharaka lepa** [10]: The leaf crushed and applies on wound to arrest bleeding. Indication: Fresh wound cuts. It will arrest bleeding. Especially useful in wound form due to bone fracture.
- **Asthisamharaka churna** [11]: *Asthishrinkhala, Arjuna, Godhuma, and Laksha* all ingredient taken in equal quantity for in fine powder form mixed with *ghrita* taken along with milk. Indication: *Asthibhangachikitsa*.
- **Asthisamharaka taila** [8]: Oil processed with whole plant for local application. Indication- It is recommended in treatment of Rheumatoid arthritis and osteoarthritis.

**Modern Aspect****Scientific Classification**

Kingdom : Plantae  
 Division : Magnoliophyta  
 Class : Magnoliopsida  
 Order : Vitales  
 Family : Vitaceae  
 Genus : Cissus  
 Species : quadrangularis

**Morphological Characters**

*Cissus quadrangularis* is a low-growing shrub with a characteristic, four-sided stem. It is a climbing plant, often found growing over lower growing vegetation. *Cissus*' thick stem is glabrous and fleshy, with constrictions at its nodes. Its alternate, simple leaves are also thick and ovate, with serrated margins. The leaves measure about 8 cm long and 6 cm broad. Numerous tendrils grow out of the plant's nodes.

**Pharmacognostical Studies [4]****a) Macroscopic**

Drug occurs as pieces of stem of varying lengths; stem quadrangular, 4-winged, internodes constricted at nodes; a tendril occasionally present at nodes; internodes 4-15 cm long and 1-2 cm thick; surface smooth, glabrous, buff coloured with greenish tinge, angular portion reddish-brown; no taste and odour.

**B) Microscopic**

Mature stem shows squarish outline with prominent projection at each anular point; epidermis single layered, covered externally with thick cuticle;

epidermal cells thin-walled, rectangular and tangentially elongated, followed by 2-3 layers of cork and single layered cork cambium; cortex composed of 8-16 layers of thin-walled, circular to oval parenchymatous cells; four patches of collenchymatous cells present in all the four angular points embedded in cortical region like an umbrella arching over large vascular bundles; in the projected portion of angular region cortical cells filled with brown-red contents present; endodermis not distinct; stele consists of a large number of vascular bundles varying in size arranged in the form of a ring separated by rays of parenchyma; 3-4 vascular bundles larger in size, in each angular region, below collenchymatous patch, while rest of bundles smaller in size; vascular bundles collateral and open type, capped by sclerenchymatous sheath which is well developed in larger bundles; cambium and interfascicular cambium quite distinct; central region occupied by a wide pith composed of thin-walled, circular to oval parenchymatous cells; idioblasts containing raphides and isolated acicular crystals of calcium oxalate present in the outer region of cortex and also in a number of cells throughout the region; rosette crystals of calcium oxalate also found in most of the cells in cortical region; starch grains present throughout the cortical and the pith regions.

**Leaf****Midrib**

Keel on adaxial side, convexly rounded on the abaxial side; ground tissue parenchymatous, thin-walled cells, those in periphery containing chloroplasts; a small patch of sclerenchyma and below this a group of collenchyma cells in the keel; a ring of 4 to 6 vascular bundles without bundle sheaths; some cells of midrib have druses and raphides, each vascular bundle consists of a centripetal xylem composed of vessels with spiral thickenings, and xylem parenchyma and an outer phloem composed of sieve tubes, companion cells and phloem parenchyma with a few small cavities dispersed among them.

**Lamina**

A section through the leaf shows well defined upper and lower epidermis comprised of parenchymatous cells rounded in vertical section and angular in surface view; stomata present on both surfaces anomocytic; mesophyll of lamina undifferentiated; margin composed of a patch of sclerenchyma; stomatal index for upper surface not more than 4 while for lower surface not more than 5.

**IDENTITY, PURITY AND STRENGTH [4]**

|                                  |          |
|----------------------------------|----------|
| Foreign matter                   | Not more |
| than 2 Percent, Appendix 2.2.2   |          |
| Total ash                        | Not more |
| than 22 Percent, Appendix 2.2.3  |          |
| Acid-insoluble ash               | Not more |
| than 1.5 Percent, Appendix 2.2.4 |          |

|  |     |      |
|--|-----|------|
| Alcohol-soluble extractive<br>than 4 Percent, Appendix 2.2.6 | Not | less |
| Water-soluble extractive<br>than 20 Percent, Appendix 2.2.7  | Not | less |

### Powder

Brown; shows fragments of vessels, fibres, parenchymatous cells and a few rosette crystals of calcium oxalate, starch grains and idioblast containing raphides and isolated acicular crystals of calcium oxalate.

### Phytochemical Constituents

*Cissus quadrangularis* have numerous bioactive compounds such as alkaloids, resveratrol, piceatannol, pallidol, parthenocissin, quadrangularins, ascorbic acid, carotene, phytosterol substances, calcium, flavonoids, vitamins, enzymes, nicotinic acid, tyrosin, and triterpenoids. *Cissus quadrangularis* contains a variety of terpenoid components, such as the balsamketone, amyryl, onocer-7-ene-3- $\alpha$ -21-diol [12], taraxerol, acetyl taraxerol, friedelin ketone [13]. The main chemical constituents are tetracyclic triterpenoids, onocer-7-ene-3- $\alpha$ , 21- $\beta$ -diol and onocer-7-ene-3- $\beta$ , 21- $\alpha$ -diol and two steroidal principles I and II,  $\alpha$ -sitosterol,  $\delta$ -amyryl. The stem contains two asymmetric tetracyclic triterpenoids, and two steroidal principles. The presence of  $\beta$ -sitosterol,  $\delta$ -amyryl,  $\delta$ -amyryl, and flavanoids (quercetin) having different potential metabolic and physiological effects have also been reported [14] and the stem has revealed unique stilbene derivatives, which are termed quadrangularins A, B and C. Other lipids and several phytosterols like heptadecyloctadecanoate, icosanylicosanoate, 4-Hydroxy-2-methyltricos-2-en-22-one, 9-methyl-octadec-9-ene,  $\alpha$ -amyryl,  $\alpha$ -amyrylacetate, friedelin-3-one, taraxerol, P-sitosterol and isopentacosanoic acid are identified in this plant. *Cissus quadrangularis* is rich in vitamin C and beta-carotene. Analysis showed that *Cissus* contained Ascorbic acid at a concentration of 479 mg, and carotene 267 units per 100g of freshly prepared paste, in addition to calcium oxalate [15].

### Pharmacological Activities

#### Bone Healing Activity

The main traditional use of *Cissus quadrangularis* is in the field of bone remineralisation and fracture. It is commonly known as the 'Bone Setter,' the plant is referred to as 'Hadjod' in Hindi because of its ability to join bones. Modern research has shed light on the capability of *Asthisanharak* to speed up bone healing as it acts as a glucocorticoid antagonist [16, 17]. Since anabolic androgenic compounds are recognized to act as antagonists to the glucocorticoid receptor as well as promote bone growth and fracture healing, it has been postulated that *Cissus* possesses anabolic and/or androgenic activities [18, 19]. Besides speeding the remodelling process of the healing bone, *Asthisanharak* also leads to much faster increase in bone tensile strength. In clinical trials it has led to a

fracture healing time on the order of 55 to 33 percent of that of controls. This plant exerts anti-glucocorticoid properties is suggested by a number of studies where bones were weekend by treatment with cortisol. While the enhanced rate of bone healing may be of great importance to the patients suffering from chronic diseases like osteoporosis [20]. Paste of alcoholic extract of the plant was used locally as well as intramuscularly that facilitates rapid healing of fracture in albino rats. Ethanol extract (95%) enhances the development of cortical bone and trabeculae in foetal femur, which may be related to rich content of calcium, phosphorous and phytoestrogenic steroids and shown to influence early regeneration and quick mineralization of bone fracture healing process.

#### Anti-Osteoporotic Activity [21]

*C. quadrangularis* has been stated in Ayurveda for its anti-osteoporotic activity. The phytoestrogen rich fraction (IND- HE) from the aerial parts of plant reveals its activity. Plant has phytoestrogen and triterpenoides. The phytoestrogen steroids isolated plant illustrates influence on early regeneration and quick mineralization of bone. The ethanolic and petroleum ether extract of *C. quadrangularis* L. confirms prominent effect. Various study validates the anti-osteoporotic activity and phytoestrogen rich fraction (IND- HE) of *Cissus quadrangularis* L. raised blood calcium level, Vitamin D3, Serum estrogen, bone mineral density and bone mineral content. There is significant enhancement in bone thickness, bone density and bone hardness. In addition to this it significantly inhibits the antianabolic effect and exerts some beneficial effects on recovery of bone mineral density. The ethanolic extract of *C. Quadrangularis* is L. reveals ethanol extract of the plant had definite anti-osteoporotic effect. Ethanol extract (95%) of whole plant possess anti-osteoporotic activity in ovariectomized rat model of osteoporosis at two different dose levels of 500 and 750 mg per kg per weight [22].

#### Anti-Oxidant and Free Radical Scavenging

Methanol extract of *Cissus quadrangularis* exhibits strong antioxidant and free radical scavenging activity in vitro and in vivo systems mainly due to the presence of  $\beta$  carotene [23, 24].

#### Central Nervous System Activity

The root extract has central nervous system depressant activity indicated by decline in exploratory behaviour. Methanol extract of roots contains saponins which reveal potent sedative activity and also inhibit spontaneous motor activity in mice [25].

#### 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 antiprotozoal activity against *Entamoebahistolytica*. Alcoholic extract of the stem showed activity against *E. coli*. Methanol and dichloromethane extract of whole plant were screened for in vitro anti-plasmodial activity. The dry stems of fresh ethyl acetate and methanol extracts have antibacterial activity, particularly against Gram-positive bacteria, such as *Bacillus subtilis*, *Sin shadow boxing bacteria* and *Staphylococcus aureus* [26].

#### Anti-Viral Activity

Anti-viral activity of partially purified methanolic extract of *Cissus quadrangularis* was established on both Herpes Simplex Virus (HSV)-1 and -2. Anti-viral activity of the plant activity was assayed using dye-uptake method. The result provided insight into potent anti-viral activity of *Cissus quadrangularis* [27].

#### Anti-Fungal Activity

Anti-fungal activity of *Cissus quadrangularis* extract was established by comparing its activity to fluconazole which was taken a standard drug. The research performed using standard agar-well diffusion method and the activity was quantified by measuring the diameter of the zone of inhibition formed on the surface of petri dishes. The result revealed the effect of *Cissus quadrangularis* extract against fungal activity and it was found out that diethyl ether extract exhibited promising activity against *Aspergillus flavus* [28].

#### Gastro-Protective Activity

*C. quadrangularis* is *L.* is rich source of arytenoids, triterpenoides and ascorbic acid, which plays a vital role in human nutrition. Many studies have analyzed and showed the effects against gastric toxicity and gastro protective effect of *C. quadrangularis* *L.* against the gastric mucosal damages induced by aspirin. The studies explain that administration of aspirin increased lipid peroxidation status, xanthenes oxides, myeloperoxidase etc. in gastric mucosa resulting in mucosal damages at both cellular level and sub cellular level which more reversed by *C. quadrangularis* *L.* extract. This finding suggests that the gastro protective creativity of *C. Quadrangularis* *L.* extract probably through its anti-oxidant and anti-apoptotic effect. Triterpenoides and sterol present in *C. Quadrangularis* *L.* have anti lipid peroxidative effect and play essential role in gastro-protective effect of *C. Quadrangularis* *L.* Extract [29].

#### 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 produce healing effect on aspirin induced gastric mucosal damage in rats through its antioxidative mechanism. Triterpenoids and

$\beta$ - sitosterol present in methanol extract possess anti-lipid peroxidating effect and thus prevent gastric damage [30].

#### Analgesic, Anti-Inflammatory and Stimulatory Activity

*Cissus quadrangularis* is potent as aspirin which was taken as standard in the treatment of acetic acid writhing mice, formalin test and tail-flick test in rats. The plant is also effective in the treatment of yeast infection induced hyper-pyrexia [31].

#### Anti-Obesity Activity

Obesity and obesity-related complications (such as metabolic syndrome) are a common problem around the globe. To investigate the usefulness of *Cissus quadrangularis* in metabolic syndrome, particularly for weight loss and central obesity a randomized, double blind, placebo-controlled study was performed, 123 overweight and obese persons were treated with *Cissus* for eight weeks, while consuming a normal or calorie-controlled diet. At the end of the trial period, significant net reductions in weight and central obesity, as well as in fasting blood glucose, total cholesterol, LDL-cholesterol, triglycerides, and C-reactive protein levels. These results suggest that *Cissus* may be useful in the management of weight loss and metabolic syndrome [32].

#### Anti-Pyretic Activity

The various serial extract of the *Cissus quadrangularis* when orally administered in albino rats showed a reduction ( $p \leq 0.01$ ) in hyperpyrexia induced by dried yeast injection with activity being pronounced in 18 hrs. This shows the antipyretic activity of *Cissus quadrangularis* [33].

#### Anti-Haemorrhoidal Activity

Anti-haemorrhoidal properties of *Cissus quadrangularis* extract was studied by measuring the venular activity of its extract on vascular smooth muscles of human umbilical vein. Results showed that the contraction occurring in extract treated smooth muscles was equal to the contraction achieved when treated with standard drug 'daflone' [34].

#### Anti-Helminthic Activity

Anti-helminthic activity of *Cissus quadrangularis* were revealed using stem extract of the plant against earthworms in a study. The effectiveness was measured by the time required by the extract to induce paralysis or cause death in test subjects [35].

#### Anti-Tumour and Cytotoxic Activity

Cytotoxic studies of *Cissus quadrangularis* ethanolic and chloroform extract was validated both on Hela and Vero cell lines in a study, the cell lines were maintained in minimal essential medisina humidified atmosphere. The  $IC_{50}$  Value of extracts was found to be

62.5 µgm/ml and 125 µgm/ml for HeLa and Vero cell lines respectively [36].

### Anti-Convulsant and Sedative Activity

Anti-convulsant effect of *Cissus quadrangularis* was established in a research by using aqueous extract of the plant. The effectiveness was gauged using the extract in several anti-convulsant tests such as N-methyl-D-aspartate (NMDA) tests, Maximal electroshock (MES) test, Strychnine (STR) test, Pentylentetrazole (PTZ) test, and Isonicotinichydrazide acid (ISH) test. Sedative activity of *Cissus quadrangularis* was also studied by measuring the effect of its extract on prolonging diazepam induced sleep and as a result the extract prolonged the sleep duration [37].

### CONCLUSION

Traditionally *Asthisanharak* is used to help heal broken bones. It is beneficial not only in building up bones but also in improving functional efficiency. Hence it is widely prescribed by Ayurvedic physician in the treatment of bone disorders like bone fractures or osteoporosis and also for *Pachana* (digestive aid), *Sara* (relieves constipation), *Athiyuk* (strengthening bones), *Vrishya* (Aphrodisiac), *Krumighna* (destroys worms), *Arshoghna* (cures piles), *Balya* (provides strength), *Amaghna* (Relieves ama - a product of indigestion and altered metabolism), *Kushthaghna* (cures skin disorders) activities. It contains phytochemical compounds like calcium oxalate, β-carotene, ascorbic acid, β-sitosterol and 3-ketosteroids, also flavonoids like quercetin, and kaempferol. The stem has two unsymmetrical tetracyclic triterpenoids, onocer-7-ene-3α, 21β-diol and onocer- 7-ene-3β, 21 α -diol, two steroidal principles I and II, δ-amyrin, δ-amyrone. These constituents are responsible for many pharmacological activities like bone healing, Anti-osteoporotic activity, Anti-oxidant, Free radical scavenging, Anti-microbial, Anti-fungal, Anti-bacterial activity, Anti-viral activity, Analgesic, anti-inflammatory and stimulatory activity, Anti-obesity activity, Anti-pyretic activity, Anti-haemorrhoidal activity, Anti-tumour and cytotoxic activity, Anti-helminthic activity, Anti-convulsant and sedative activity, Anti-ulcer activity and Gastro-protective activities etc. From ancient time *Asthisanharak* has been used as curative agent in various diseases. Therefore, there is the requirement to investigate the biological activity of its phyto-constituents at molecular level to exhibit its unexplored potential for development of an effective, safe and cheap herbal drug.

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