

Research Article

A REVIEW ON *CISSUS QUADRANGULARIS* AND EVALUATION OF ITS IN- VITRO ANTHELMINTIC ACTIVITY

***Akshada Kakade, Yuvraj Dange, Pradip Patil, Sanjay Pawar, Swapnil Patil, C.S. Magdum,
S.K. Mohite and Indrayani Raut**

Department of Pharmaceutical Chemistry, Rajarambapu College Of Pharmacy, Kasegaon

**Author for Correspondence*

ABSTRACT

In current scenario focus on plant research has increased throughout the world and show immense potential of medicinal plants used in various traditional systems. Production of plant-made pharmaceuticals can gain more capital for new therapeutics. This paper highlights some of the phytochemical and pharmacological investigations of *Cissus quadrangularis*. *Cissus quadrangularis* L. is a succulent plant of family Vitaceae commonly found in tropical and subtropical xeric wood. It is a fleshy, cactus-like liana widely used in India. The plant is prescribed in Ayurvedic literature as a general tonic and analgesic, with specific bone fracture healing properties. The plant is believed to be useful in helminthiasis, anorexia, dyspepsia, colic, flatulence, skin diseases, leprosy, hemorrhage, epilepsy, convulsion, haemoptysis, tumors, chronic ulcers, swellings. The aim of the present study was the collection of Stem of *Cissus quadrangularis*, powdered and its successive extraction by soxhlet method. Then extracts are subjected to evaluate in vitro anthelmintic activity on earthworm *Pheretima posthuma* (Annelida). Extracts of *Cissus quadrangularis* Linn stem were subjected to qualitative phytochemical tests for different constituents and it was confirmed that the different plant extract contains constituents such as Phenolic compounds, tannins, saponins, steroids, carbohydrates, glycosides and triterpenoids etc. It is concluded by saying that, active constituents responsible for good pharmacological activity. Needless to say that versatile uses and various therapeutic activities has made plant a valuable medicinal herb.

Keywords: *Cissus Quadrangularis*, Extraction, Phytochemical, Anthelmintic

INTRODUCTION TO PLANT

Cissus quadrangularis (Linn) has been used by common man in India for promotion of fracture healing and well known as Hadjod. It is also known as *Vitis quadrangularis* wall which belongs to family Vitaceae. It is a common perennial climber, which is distributed throughout India particularly in tropical regions (Raj, 2011). The plant is commonly known as Vajravalli in Sanskrit, Hadjod in Hindi, Kandvel in Marathi, Haddjor in Punjabi, Hadbhanga in Oria, Vedhari in Gujrati, Perandi in Tamil, Nalleru in Telugu and Veldgrap, Edible Stemmed Vine in English. Dichotomously branched, sub- angular, glabrous, fibrous and smooth (Rastogi, 1995). *Cissus quadrangularis* L. is commonly known as Asthisamhari is a succulent plant of family Vitaceae commonly 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 (Anonymous, 1992).



Figure 1: Photo of *Cissus quadrangularis* (Linn)

Research Article

Classification

Kingdom	-Plantae
Division	-Magnoliophyta
Class	-Magnoliopsida
Order	-Vitales
Family	-Vitaceae
Genus	- <i>Cissus</i>
Species	- <i>quadrangularis</i>

Pharmacognosy

The leaves are simple or lobed, cordate, broadly ovate or reniform, serrate, dentate, sometimes 3-foliate and glabrous. Flowers are small, greenish white, bisexual, tetramerous, opposite to the leaves (Chopra, 1958). Fruit globose or obovoid fleshy berries. The stem and leave of *C. quadrangularis* is used for the treatment of hemorrhoid, menstrual disorder, scurvy and as antioxidant, anti-flatulence, antibacterial, antifungal (Murthy, 2003). In India it is used for many diseases (Yoganarsimhan, 2000). The extract of the plant exhibit cardiogenic and androgenic property.

Two capsules of 500 mg dry powder of *C. quadrangularis* taken twice daily were very effective in the treatment of hemorrhoidal pain and inflammation as well as reducing the size of hemorrhoids (Segsunviriya, 1989)

Phytochemistry

Phytochemical studies of *Cissus quadrangularis* have shown the presence of various versatile constituents such as flavanoids, triterpenoids, Vitamin C, stilbene derivatives and many others, e.g. resveratrol, piceatannol, pallidol perthenocissin and phytosterols. Out of which ascorbic acid, triterpene, β -sitosterol, ketosteroid, two asymmetrical tetracyclic triterpenoids and calcium were identified as major constituents of this plant (Jainu, 2004; Enechi, 2003). Phytochemical screening of *Cissus quadrangularis* revealed high contents of ascorbic acid, carotene, anabolic steroidal substances, and calcium. The stem contains two asymmetric tetracyclic triterpenoids, and two steroidal principles. The presence of β -sitosterol, δ -amyrin, δ -amyrone, and flavanoids (quercetin) having different potential metabolic and physiological effects has also been reported (Jakikasem, 2000)

Traditional Properties

Cissus quadrangularis is an ancient medicinal plant native to the hotter parts of Ceylon and India. It has been used by common folk in India for promoting the fracture healing process. It was prescribed in the ancient Ayurvedic texts as a general tonic and analgesic, with specific bone fracture healing properties. *Cissus quadrangularis* is used for obesity, diabetes, a cluster of heart disease risk factors called metabolic syndrome and high cholesterol. It has also been used for bone fractures, weak bones (osteoporosis), scurvy, cancer, upset stomach, hemorrhoids, peptic ulcer disease (PUD), painful menstrual periods, asthma, malaria, and pain. *Cissus quadrangularis* is also used in bodybuilding supplements as an alternative to anabolic steroids. *Cissus quadrangularis* stem resembles the shape of bones and joints in the body (Raj, 2011). And indeed it is very effective in strengthening the bones and joints. It is explained as Asthi samharaka, Ashti Shrunkhala and Vajravalli. Modern research has shed light on *Cissus*' ability to speed bone healing by showing it acts as a glucocorticoid antagonist¹⁴. *Cissus* possesses anabolic and androgenic properties. In addition to speeding the remodeling process of the healing bone, *Cissus* also leads to a much faster increase in bone tensile strength. In clinical trials *Cissus* has led to a fracture healing time on the order of 55 to 33 percent of that of controls. *Cissus* exerts antiglucocorticoid properties is suggested by a number of studies where bones were weakened by treatment with cortisol, and upon administration of *Cissus* extract the cortisol induced weakening was halted, and maintain the healing process. It has been prescribed in Ayurveda as an alternative, antihelminthic, dyspeptic, digestive, tonic, analgesic in eye and ear diseases, and in the treatment of irregular menstruation and asthma (Chopra, 1963).

Research Article

Pharmacological Activity Of *Cissus Quadrangularis*

Various Pharmacological activity of *Cissus Quadrangularis* were performed by Prasad (1972) and Jainu (2003) such as Bone fracture healing activity, Analgesic activity, Antiosteoporotic activity, Antioxidant activity, Parasympathomimetic activity, Antiulcer activity.

INTRODUCTION TO HELMINTH

Helminth infections are among the most widespread infections in humans, distressing a huge population of the world. Although the majority of infections due to helminths are generally restricted to tropical regions and cause enormous hazard to health and contribute to the prevalence of undernourishment, anaemia, eosinophilia and pneumonia (Bundy, 1994) Parasitic diseases cause ruthless morbidity affecting principally population in endemic areas (Tagbota, 2001). The gastro-intestinal helminthes becomes resistant to currently available anthelmintic drugs therefore the reisa fore most problem in treatment of helminthes diseases. Hence thereis an increasing demand towards natural anthelmintics (Sondhi, 1994)

MATERIALS AND METHODS

Collection of plant materials

The plant was collected from Bhimashankar area, Tal maval from Pune regions of Maharashtra.

Preparation of plant extract:

The plant is washed in tap water, shade dried for 10 days and made into a fine powder. Following that, 100 gram of powder was filled in thimble and succive extraction using soxhlet apparatus for 8-10 hours with 500ml of Pet-ether, chloroform and Methanol was carried out (Udupa, 1964). The extract is dried and used for phytochemical Screening.

Qualitative phytochemical Analysis:

Both methanolic and aqueous extract of *Cissus quadrangularis* Linn root were subjected to qualitative phytochemical tests for different constituents such as alkaloids, carbohydrates, glycosides, Flavonoids, Phenolic compounds and tannins, proteins and free amino acids, saponins, steroids, and triterpenoids (Murthy, 2003).

Table 1: Phytochemical screening of plant

Phyto chemicals Tests	Result
Alkaloids	+
Carbohydrates	+
Tannins	+++
Proteins	+
Flavonoids	+++
Glycosides	++
Saponins	-
Phenolic	-

Worms collection

Indian earthworm *Pheretima posthuma* (Annelida) were collected from the water logged areas of soil from Kasegaon region (Ajaiyeoba, 2001)

Procedure

The anthelmintic activity was evaluated on adult Indian earthworm *Pheretima posthuma* worm due to its anatomical and physiological resemblance with the intestinal round worms parasites of human beings and it can be used as a screening model or anthelmintic drugs as advocated earlier. Three different concentrations, each of crude methanolic and aqueous extract (10,25, 50 mg/ml in distilled water) were prepared and six worms (same type) were placed in it (Vidyadhar, 2010). Observations were made for the time taken to cause paralysis and death of the individual worms. Mean time for the paralysis (P) in min

Research Article

was noted when no movement of any sort could be observed ,except when the worm was shaken vigorously; time of death (D) in min was recorded after ascertaining the worms neither moved when shaken vigorously nor when dipped in warm water (50°C). Piperazine citrate (10mg/ml) was included as reference compound (Martin, 1985).

Table 2: Anthelmintic activity of *Cissus Quadrangularis*

Group	Test subs	Concentration (mg/ml)	Time taken for paralysis (P) and death (D) of worms in min	P	D
A	Vehicle	-	-	-	-
B	Piperazine citrate	10		18.83 ± 0.60	60.33 ± 0.49
C	Methanolic extract	10		26.5 ± 0.56	65.0 ± 0.36
		25		12.30 ± 0.35	51.06 ± 0.58
		50		14.0 ± 0.56	40.55 ± 0.42
E	Aqueous extract	10		29.17 ± 0.47	67.83 ± 0.60
		25		20.5 ± 0.56	50.5 ± 0.42
		50		15.67 ± 0.71	40.67 ± 0.55



Figure 2: Effect of Extracts on the Paralysis (Or) Helminthiasis of the Worm

RESULT AND DISCUSSION

Preliminary phytochemical screening of *Cissus quadrangularis* Linn has shown the presence of tannin, steroids, triterpenoid, carbohydrates and glycosides .Methanolic and aqueous extract exhibited anthelmintic activity in dose-dependent manner giving shortest time of paralysis (P) and death (D) with 100 mg/ml concentration. The methanolic extract of *Cissus quadrangularis* Linn caused paralysis in 14 min. and time of death of 40.55 min. while aqueous revealed paralysis in 15.67 and 40.67 min. respectively against the earthworm *Pheretima posthuma*. The reference drug Piperazine citrate showed the same at 18.83 and 60.33 minutes, respectively. Piperazine citrate by increasing chloride ion conductance of worm muscle membrane produces hyper polarization and reduced excitability that leads to muscle relaxation and flaccid paralysis. Tannins were shown to produce anthelmintic activities chemically tannins are polyphenolic compounds. It is possible that tannins contained in the extracts of *Cissus quadrangularis* Linn produced similar effects. Reported anthelmintic effect of tannins is that they can bind to free proteins in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and may cause death (Ajaiyeoba, 2001)

Conclusion

These findings Support the traditional knowledge of local users and it is a preliminary, scientific, validation for the use of these plants for anthelmintic activity and other like antiosteoporotic activity to promote proper conservation and sustainable use of such plant resources. The millenarian use of these

Research Article

plants in folk medicine suggests that represent an economic and safe alternative to treat bone related diseases.

ACKNOWLEDGEMENT

The author is very much grateful to Hon. principal Dr. C.S. Magdum and Vice principal Dr. S.K. Mohite of Rajarambapu College of Pharmacy, Kasegaon, for their valuable and continued moral support to bring out this research work.

REFERENCE

- Ajaiyeoba EO, Oncha PA and Olarenwaju OT (2001).** In- vitro anthelmintic properties of Buchholzia coiaceae and Gynandropsis gynandra extract. *Pharmaceutical Biology* **39**(3) 217- 20.
- Anonymous (1992).** *Indian Medicinal Plants* 2 (Orient Longman Ltd) 112.
- Bundy DA (1994).** Immunoepidemiology of intestinal Helminthic infection I: The global burden of intestinal nematode disease. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 259-61.
- Chopra NN, Chopra IC, Handa KL and Kapur LD (1958).** Cissus quadrangularis. *Indigenous Drugs of India* edited by Dhar UD (Calcutta) 669–670.
- Chopra SS, Patel MR, Gupta LP and Datta IC (1975).** Studies on *Cissus quadrangularis* in experimental fracture repair: effect on chemical parameters in blood. *Indian Journal of Medical Research* (6) 824-825.
- Enechi OC and Odonwodo I (2003).** An assessment of the phytochemical and nutrient composition of the pulverized root of *Cissus quadrangularis*. *Bio-Research* **1** 63–68.
- Jainu M and Devi CS (2003).** Potent antiulcerogenic activity of methanol extracts of *Cissus quadrangularis* by antioxidative mechanism. *Journal of Clinical Biochemistry and Nutrition* **34** 43–47.
- Jainu M and Devi CS (2004).** Effect of *Cissus quadrangularis* on gastric mucosal defensive factors in experimentally induced gastric ulcer- a comparative study with Sucralfate. *Journal of Medicinal Food* **7**(3) 372-376.
- Jakikasem S, Limsiriwong P, Kajsongkarm T and Sontorntanasart T (2000).** Phytochemical study of *cissusquadrangularis*. *Thai Journal of Pharmaceutical Sciences* (24) 25.
- Justin S Raj and Baby Joseph (2011).** Pharmacognostic and traditional properties of *Cissus quadrangularis* Linn -An overview. *International Journal of Pharma and Bio Sciences* **2**(1) 132-139
- Martin RJ (1985).** Y-Amino butyric acid and piperazine activated single channel currents from *Ascaris* sum body muscle. *British Journal of Pharmacology* **84**(2) 445-61
- Murthy KNC, Vnitha A, Swamy M and Ravishankar GA (2003).** Antioxidant and antimicrobial activity of *Cissus quadrangularis*. *Journal of Medical Food* **6**(2) 99–105.
- Prasad GC and Udupa KN (1972).** Pathways and site of action of a phytochemical steroid from *Cissusquadrangularis*. *Journal of Research in Indian Medicine* **4** 132.
- Rastogi RP and Mehrotra BN (1995).** *Compendium of Indian Medicinal Plants* Part I (Publication and information directorate) 104.
- Segsunviriya C and Choomprabutra (1989).** A clinical study of *Cissus quadrangularis* Linn. in hemorrhoid patients. In: *Seminar of Research and Development of Medicinal Plant. Division of Medical Research, Department of Medical Sciences, Ministry of Public Health, Thailand* 54–55
- Tagbota S and Townson S (2001).** Antiparasitic properties of medicinal and other naturally occurring products. *Advances in Parasitology* **50** 199-205.
- Udupa KN and Prasad G (1964).** Bio chemical Ca⁴⁵ studies on effect of *Cissus quadrangularis* in fracture repair. *Indian Journal of Medical Research* **52** 480-487
- Vidyadhar S, Saidulu M, Gopal TK, Chamundeeswari D, Umamaheswara Rao and David Banji (2010).** In Vitro Anthelmintic Activity Of The Whole Plant *Ofenicostemma Littorale* By Using Various Extracts. *International Journal of Applied Biology and Pharmaceutical Technology* **1**(3) 1119
- Yoganarsimhan SN (2000).** *Medicinal plants of India* (Cyber Media Bangalore) **2** 136–137.