

## Studies on pharmacognostical analysis of leaves of *Cissus quadrangularis* Linn

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### ABSTRACT

Various diseases have been used for the treated with plants of since ancient times. Plant-derived drugs have been used extensively by Vaidya, Kaviraj and herbal practitioners for centuries. *Cissus quadrangularis* Linn. is an ethnomedicinal plant that grows as a perennial climber in the Vitaceae family. Popularly known as Hadjod which means bone setter due to its cementing properties during breakage. The present work deals with the Macroscopic and Microscopic characters of the *Cissus quadrangularis* Linn. plant had been carried out such as anatomy, quantitative microscopy, physical constants and fluorescence analysis of the plant leaves. The epidermal peeling of *Cissus quadrangularis* Linn. leaf exhibited Stephanocytic type of stomata. Transverse section of leaves and petiole of the plant were studied and characteristic features were observed. Macroscopic observation for the fresh leaves such as shape and size, colour, surfaces, apex, base, texture, odour and taste were studied.

**Key Words** - Kaviraj, Vitaceae, Cementing, Breakage, Stomata, Pharmacognostic

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### INTRODUCTION

Pharmacognosy, which deals with the understanding of medicinal plants, is a vital subject in the Global Pharmaceutical Education curriculum. The *Cissus quadrangularis* Linn is a medicinal plant that originated in India which is commonly utilized by people to heal fractures. In Hindi, it is also referred to as "Hadjod" (Mishra Garima *et al.*, 2010). Broken bones, injured ligaments and tendons can be repaired with Asthisamharaka (Fernandes Gabriel *et al.*, 2012). The *Cissus quadrangularis* Linn plant has a significant economic value. The leaves and stems have an abundance information about the plant species. Stems are typically used for healing fractures of bones, due to their active principal, which has an itching quality and succulent property.

Taxonomical classification of *Cissus quadrangularis* Linn

Kingdom - Plantae

Division - Magnoliophyta

Class - Magnoliopsida

Order - Vitales

Family - Vitaceae

Genus - *Cissus*

Species - *Cissus quadrangularis*

**Table 1- Synonyms of *Cissus quadrangularis* Linn**

Language	Names
Hindi	Hadjod, Hadkankan, Gathjod
English	Edible Stemmed Vine
Bengali	Hadjod, Harbhanga
Sanskrit	Asthisamharaka

*Cissus quadrangularis* Linn is a perennial succulent plant which belongs to the family Vitaceae (grape family) height ranges from 2-4 cm in length, internodes 3-18 cm long and 1.5-2cm thick. Green leaves simple, 2-6 cm long, short peduncle cymes with umbellate small flower and Quadrangular stem. The purpose of study is to assist in the classification *Cissus quadrangularis* Linn by utilizing their stomatal characteristics. This study would enhance the identification and authentication of the most effective medicinal plant for Stomatogenesis. Facilitating standardization and therapeutic research on formulations using leaf material of *Cissus quadrangularis* Linn would be advantageous.

## MATERIALS & METHODS

### Collection of the plant material and study of Stomata

Fresh leaves of *Cissus quadrangularis* Linn used for the study were collected from in my home garden and taxonomically identified by from the local Flora (Haines, 1924). They were washed in tap water and immersed in water to facilitate peeling. Peeling was done by means of sharp razor blade at the adaxial and abaxial surfaces of the leaves. They were then stained for few seconds with safranin and mounted on slides. The slides were observed under microscope (Magnification 40x X 10x eye piece). The stomata index and stomata number are crucial diagnostic features for monocot leaves (Katare Vivekanand et al.,2012). Frequency count per unit area was also made from the slides. Stomatal Index (S.I) was calculated using the formula below.

$$S.I = S / E + S * 100$$

Where, S = number of stomata

E = number of epidermal cells per unit area

The measurements were made with an ocular micrometer, carefully valued by comparison with a stage micrometer (Sahay Sneha and Kumar Jyoti, 2017).

### Macroscopic Study

Macroscopical examination was performed on the plant *Cissus quadrangularis* Linn and observations were recorded. The proper examination of the

plant parts was carried out under the sunlight and artificial source similar to day light.

### Microscopical Study

The qualitative studies were performed. Transverse section of leaf and petiole were cut and stained with safranin (1%) light green. Free hand transverse sections of leaf were, studied for different microscopic characters and photographs of different magnifications of the sections has been taken.

## RESULTS

### Collection of the plant material and study of Stomata

The green mature leaves of *Cissus quadrangularis* Linn were taken from my garden after 11.30 am, to study the type of stomata, stomatal number, stomatal index. The leaf epidermis is peeled by a blade and after that the peeled portion is cleaned with the help of a brush. Then the portion is slightly stained with safranin and mounted with glycerine and observed under the microscope in high power (10 X 40). Study of stomata has been done. Stomatal number is average number of stomata per square mm. of epidermis of leaves. It can be calculated by stomatal index. Stomatal index is the percentage number of stomata to the total number of epidermal cell and unit area of the leaf.

**Table I: Dorsal surface of leaves of stomata of *Cissus quadrangularis* Linn**

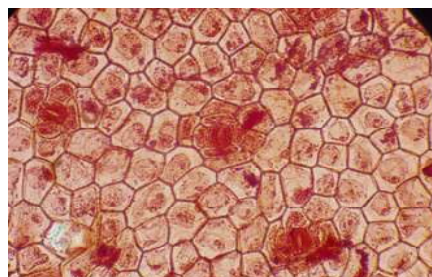
No. of readings	Number of Stomata (Apex, Middle, Base)	Number of Epidermal cells (Apex, Middle, Base)	Stomatal index (S.I)
1.	18	456	4
2.	16	474	3
3.	21	438	4
4.	20	417	4
5.	23	424	5
6.	29	487	6
7.	21	545	4
8.	25	504	5
9.	21	541	4
10.	20	477	4

**Table II: Ventral surface of leaves of stomata of *Cissus quadrangularis* Linn**

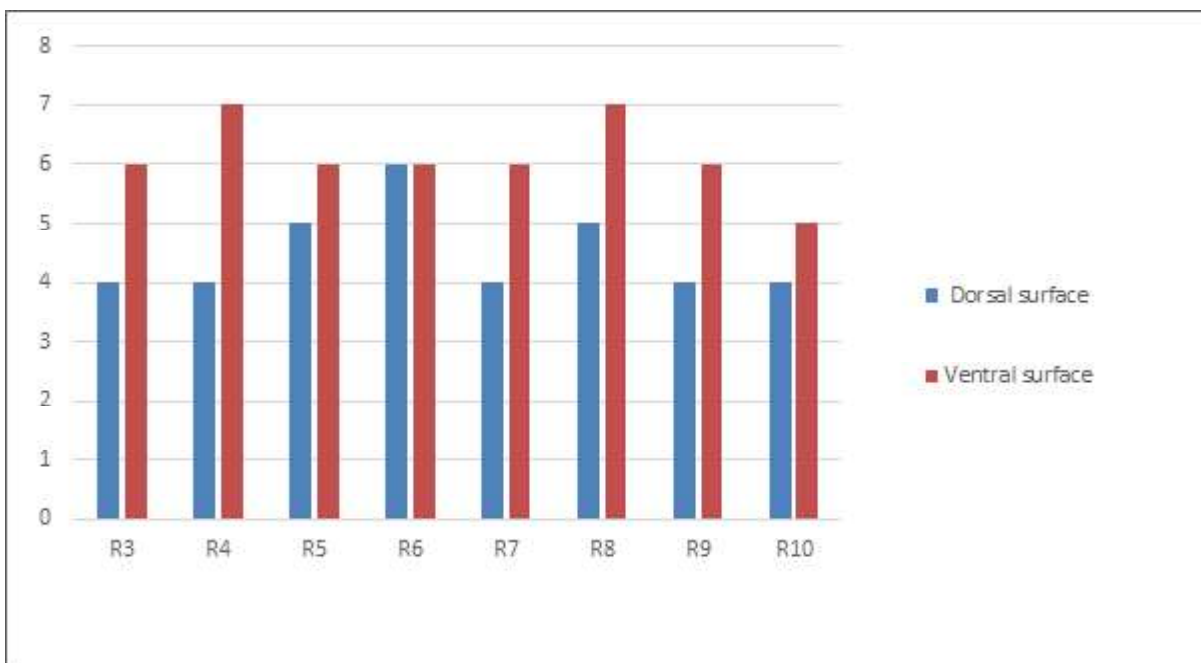
No. of readings	Number of Stomata (Apex, Middle, Base)	Number of Epidermal cells (Apex, Middle, Base)	Stomatal index (S.I)
1.	23	439	5
2.	25	441	5
3.	30	477	6
4.	34	479	7
5.	30	483	6
6.	35	530	6
7.	35	527	6
8.	40	532	7
9.	35	536	6
10.	31	562	5



**Fig-1: *Cissus quadrangularis* Linn**



**Fig-2: Anomocytic Stomata of *Cissus quadrangularis* Linn**



**Graph1- Comparative stomatal index of Dorsal and Ventral surface of *Cissus quadrangularis* Linn**

**Macroscopic Study**

For morphological investigation, macroscopic characters like size, shape, surface, colour, odour, taste and others were examined (Kokoski *et al.*, 1958). Leaves are simple or lobed, cordate, broadly ovate or reniform, serrate, dentate, sometimes 3-foliolate and glabrous. Stem is buff colored with

greenish ting, dichotomously branched, sub-angular, glabrous, fibrous and smooth. Different parts of the stem contain drugs. Internode measures 4-5cm long and 1-2cm thick, a tendril occasionally present at nodes. Flowers are small, greenish white, bisexual, tetramerous, in umbellate cymes, opposite to the leaves. Petals are 4-5,

imbricate and Calyx is short, entire, deciduous and cup shaped. Fruit are globose or ovoid fleshy berries, succulent, very acrid, dark purple to black. Roots are aerial, develop during rainy season.

### Microscopical Study

The prescribed method was used to cut, clear and stain a free hand section of the leaf for microscopical studies (Brain, 1975; Khandelwal, 1998). T.S of leaf in the midrib region revealed convex adaxial side and short conical abaxial side. The midrib possesses thin epidermal layer of small thick-walled squarish cells (Vijayalakshmi A. *et al.*, 2013). The ground tissues in the adaxial part are small circular compact thick walled. The ground tissue is disintegrated in other regions of the midrib, resulting in the presence of only small lobed parenchyma cells. The midrib has four radiating arms of vascular strands that made up its vascular system. Two or three rows of xylem elements are present in the collateral vascular strand and the phloem is situated on the outer ends of the xylem segments. The xylem is comprised of cells that are circular, narrow and thick walled. Transverse section of leaf in the lamina has fairy appearance on the dorsiventral surface with adaxial palisade and abaxial spongy mesophyll differentiation. The lamina has single row cylindrical palisade cells in the adaxial part and layers of spherical spongy parenchyma cells in the abaxial region. Calcium oxalate crystals called raphides are present in thick bundles throughout the mesophyll tissue.



A



B



C

**Figure- 3: Transverse section of leaf; A: showing ground tissues; spongy mesophyll cells, B: T.S of leaf through midrib; showing vascular bundle, C: T.S of petiole**

### CONCLUSION

The current study examined the Pharmacognostical characteristics of *Cissus quadrangularis* Linn. The various parameters established in this study will promote in controlling the standards and quality of the raw material of *Cissus quadrangularis* Linn. Traditionally the plant (Hadjod) applying for healing fracture of bones. Additionally, it has been utilized for its anti- inflammatory properties. The ethnobotanical indices have consistently ranked herbal medicinal plants that are commonly used by the locals at the top of the list. The use of medicinal plants has increased due to the

diversification of reasons for using them in modern diseases. Lack of knowledge can cause both overuse and misuse due to this increased demand. plant belongs to the genus 'Cissus' are widely used in all the continents to treat various ailments (Nautiyal Rakhi and Chaubey Suresh, 2019).

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