Pharmacognostical and Phytochemical Studies Of *Callisia repens* – Turtle Vine

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Abstract*: Herbal resources are natural treasures for traditional medicine, folk medicines, modern medicines nutraceuticals, food supplements, pharmaceutical intermediates and chemical precursors for synthetic drugs. The creeping inch plant traditionally recognized as *Callisia repens* or turtle vine is a perennial herb that belongs to Commelinaceae family. Due to its many therapeutic qualities, this plant has attracted interest. Flavanoids, tannins, saponins, phenolic compounds and essential oils are the phytochemical compositions of *Callisia repens* contribute to its therapeutic potential. Tannins and flavanoids are phenolic compounds found in plants that have anthelmintic properties. They work by binding to protein in the parasite and damaging its digestive tract and reproductive system. Generally, *Callisia repens* has a considerable medicinal value, whose efficacy is supported by both modern research and traditional use. The aim of this review is to establish various pharmacognostical, physiochemical parameters of the leaf extract of *Callisia repens.

***Index terms: Callisia repens,* Morphological characteristics, Phytochemical screening , Pharmacognostical study.**

I. INTRODUCTION

Callisia repens, also known as creeping inch plant is a succulent plant hailing from the Commelinaceae family. It comes from central and South America where it has been noticed due to its different growing habits that make it good for decorations like in the houses, it has been used in traditional medicine for various purposes. Some of its potential medical applications are antibacterial, antifungal, antioxidant, antidiabetic etc. This creeping herb is characterized by bright leaves and small blossoms contain many phytochemicals which make this shrub have antioxidant effect as well as an inhibition of microbial activity. The phytochemical constituents include flavonoids, tannins, steroids, saponins, phenolic compound. However macroscopic, microscopic evaluation, physiochemical, phytochemical studies of *Callisia repens* have not been well explored. Therefore in present research work, authentication, pharmacognostical, physicochemical and phytochemicals investigation of leaves of *Callisia repens* has been carried out for its standardization. In other words, the various health benefits as well as medicinal uses of *Callisia repens* with an eye to setting out prospects for further research and gaps that exploiting all the capabilities inherent it.

II.TAXONOMY AND NOMENCLATURE

Callisia repens belongs to the Commelinaceae family and is commonly referred to as creeping inch plant or turtle vine. It is a succulent plant originating from centralized America and southward America that is widely known for its creeping growth habit; henceforth normally grown for ornamental use.

Hierarchy of classification within the plant kingdom as follows:

Kingdom: Plantae

Phylum: Streptophyta

Class: Equisetopsida

Subclass: Magnoliidae

Order: Commelinales

Family: Commelinaceae

Genus: Callisia

Species: *C. repens*

The classification emphasizes how the plant evolved and fits in the commelinaceae family which is also shown by similar characteristics between it and other commelinaceae species. A systematic way of calling *Callisia repens* enhances its naming process for easier comprehension among scientists thus promoting clear botanical studies and horticultural practices in general.

III.MATERIALS AND METHODS

Collection of *Callisia repens*

Callisia repens leaves were collected from the Department of botany, University of kerala, Kariavattom. Leaves were dried under shade for 30 days. The dried leaves were powdered and stored in desicators for further analysis.

Fig:1 ***Callisia repens***

Authentication of *Callisia repens*

The plant was authenticated by botanists under the supervision of Dr. E. A. Siril, Head in charge of Department of Botany, University of Kerala, Kariavattom. The voucher specimen has been kept in the herbarium (Voucher no. KUBH 11537) at Department of Botany at the University of Kerala, Kariavattom.

IV.PHARMACOGNOSTICAL EVALUATION

The pharmacognostical study has been done by performing morphological and microscopic analysis of leaves.

Morphological features

Morphological features of the leaf such as the color, odor, size, shape, shape, and taste were studied. Organoleptic evaluation can be done by means of sense organs, which provide simplest as well as quickest means to establish the identity and purity to ensure the quality of a particular drug. Organoleptic characters such as shape, size, color, odour, taste and leaf structure like margin, apex, base, surface, venation etc are evaluated.

Microscopic anlaysis

Transverse section of midrib, petiole and lamina of fresh leaf were cut by using potato pith method. The sections were cleared by boiling with chloral hydrate solution and stained with a mixture of phloroglucinol and hydrochloric acid (1: 1), and studied under a compound microscope (10x and 45x).

Leaf constants

Stomatal number: stomatal number is the average number of stomata per square millimeter of a leaf's epidermis.

Stomatal index: Stomatal index is the ratio of number of stomata to the number of epidermal cells in a leaf.

Palisade ratio: palisade ratio is the average number of palisade cells under one epidermal cell.

Vein islet number: vein islet number is the average number of veinlets that surround a small green area in a square millimeter of a leaf's surface

Vein termination number: vein termination number is the number of veinlet terminations per square millimeter of a leaf's surface

Powder microscopy

Powder microscopy has been performed by using coarse powder of leaf. This study was used for identification of various diagnostic characters of leaf powder.

Physicochemical parameters

Physicochemical constants such as total ash , acid insoluble ash, water soluble ash, water soluble extractive value, alcohol soluble extractive value, foaming index, and loss on drying were determined as per WHO guidelines.

Preliminary phytochemicals analysis

For phytochemical analysis, two types of extracts which is ethanol and aqueous extraction method of dried powder of leaves of *Callisia repens.* These extracts were screened for the presence of various phytochemical constituents in the leaves of *Callisia repens*.

V.RESULTS

Macroscopic analysis

Callisia repens is a creeping plant belonging to the family Commelinaceae. Description of morphological characters is compiled in the table 1

Table 1 : Morphological characters of Callisia repens

SLNO	CHARACTERS	*CALLISIA REPENS*
1	Dimensions	Length of the leaf = 1-4cm Width of the leaf =0.6-1.5 cm
2	Colour	Light green
3	venation Margin and apex Leaf Base Surface and texture Phyllotaxis Leaf arrangement Shape	Parallel Entire margin and acuminate Asymmetric with subchordate Smooth(glabrous) Alternatively arranged leaves Alternate opposite Ovate to lanceolate
4	Taste	bitter
5	Odour	Characteristic and pleasant

Microscopic analysis

TS of petiole of *Callisia repens*

Transverse section of petiole of *Callisia repens* contains epidermis as the outermost layer which consist of multicellular covering trichomes and the cells contains mucilage. The outermost layer (epidermis) is covered with cuticle. Collenchyma is the layer that are found below the epidermis, and the layers are arranged in a compact manner, with little to no intercellular space. It also consist of collenchymatous hypodermis which are present beneath the epidermis layer. It consists of radially arranged vascular bundles i.e, conjoint, collateral, and closed. Each vascular bundles consist of xylem and phloem which is a complex tissue that is surrounded by a bundle sheath.

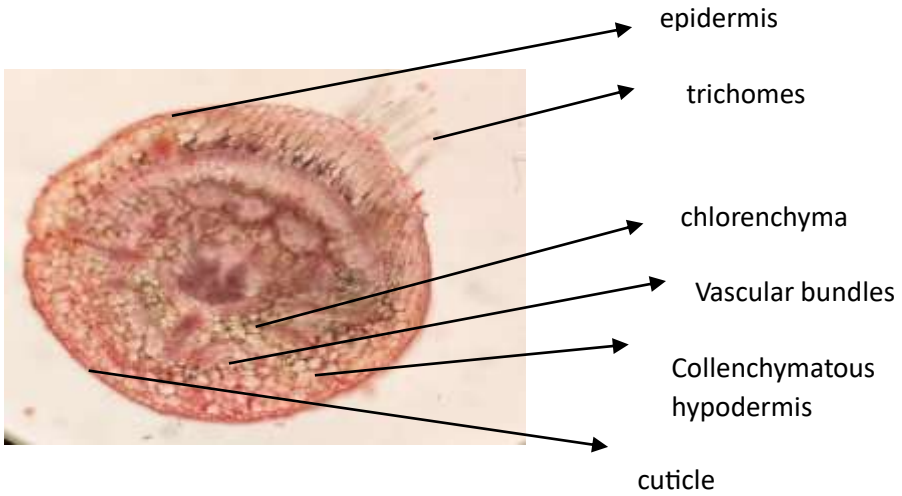

Fig 2: TS of petiole

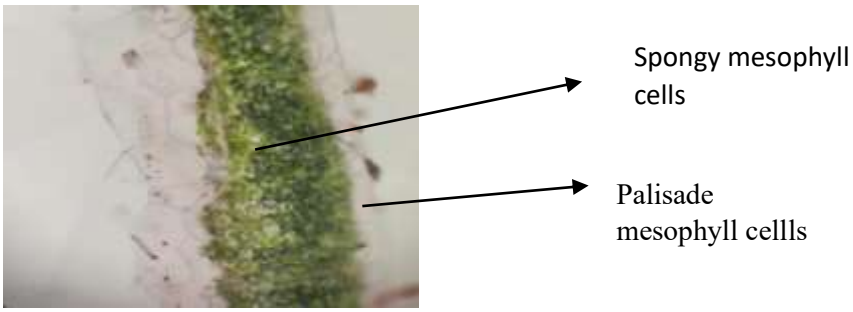

Fig 3: Mesophyll cells

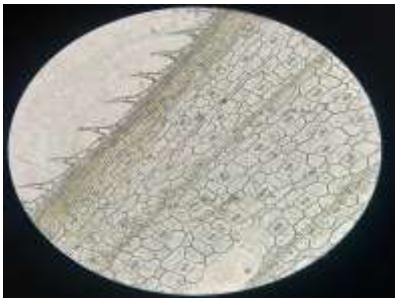

Fig4: TS of epidermis

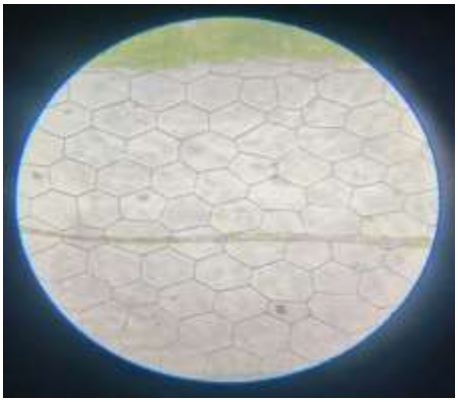

Fig 4: Palisade cells

Fig 5: Multicellular covering trichomes

Powder microscopy

Leaf powder was brownish green in colour. Main diagnostic characters of leaf were epidermal cells (fig 6) and trichomes(fig 7). The stomata were Diacytic with two subsidiary cells around the guard cells in the epidermal cells.

Fig 6: Epidermal cells

Fig 7: Trichomes

Physicochemical analysis

Table no :2 Results of phytochemical analysis

Sl no	Physicochemical parameters	Result
1	Total ash	6%w/w
2	Water soluble ash	3%w/w
3	Acid insoluble ash	2%w/w
4	Water soluble extractive value	9.6%w/v
5	Alcohol soluble extractive value	5.6%w/v
6	Loss on drying	14%w/w
7	Foaming Index	Below 100

Phytochemical Screening of Ethanol and Aqueous extract

Phytochemicals present in different extracts

Phytochemical	Ethanol extract	Aqueous extract
Carbohydrate	+	+
Proteins and Amino acid	+	+
Fats and oils	-	-
Steroids	+	+
Cardiac glycoside	+	+
Saponin glycoside	+	+
Flavonoids	+	+
Alkaloids	-	-
Tannins and phenols	+	+
Anthraquinone glycoside	-	-

Leaf constants

Leaf constants	**Value**
Stomatal number	17
Stomatal index	13.85
Palisade ratio	70.75

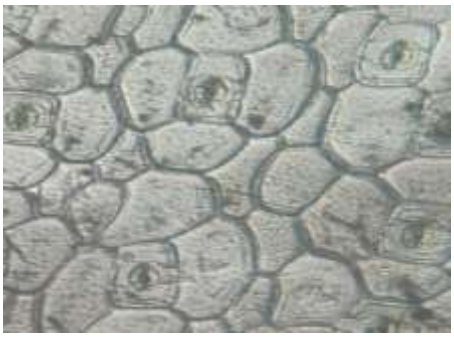

Fig 8: stomata

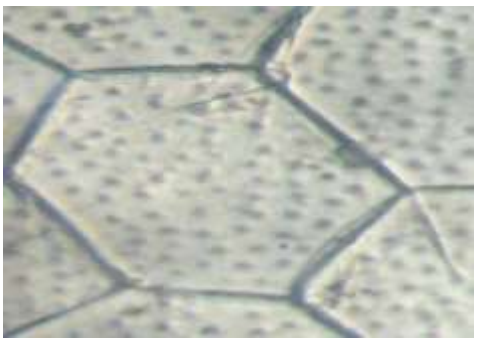

Fig9: Palisade cells

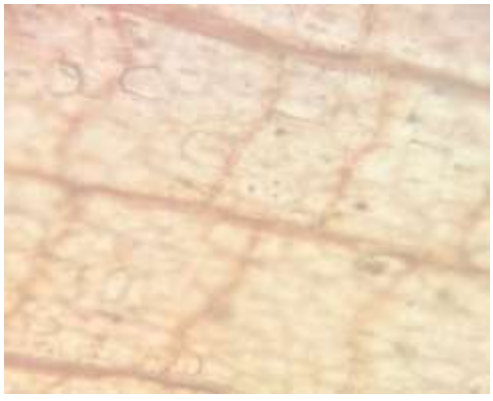

Fig 10: Parallel venation

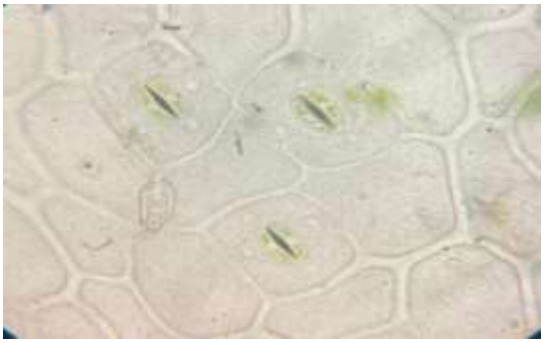

Fig 11: Diacytic stomata

CONCLUSION

Organoleptic evaluation can be done by means of sense organs, which provide the simplest as well as quickest means to establish the identity and purity to ensure quality of a particular drug. Microscopic analysis is the one of the cheapest methods to correctly identify the particular drug and the surety of raw material. Morphological and microscopical studies of leaf will be helpful in identification of *Callisia repens*. Quantitative analysis of some pharmacognostic characters are helpful to establish quality standards of the plant. Different parameters used for identification of different plant parts are so important for drug evaluation. The results of all type of analysis are helping in establishing quality control standards and purity assurance of drugs. Physiochemical parameters such as ash value and extractive values serves as an important parameter to detect any kind of adulteration and presence of foreign inorganic matter such as metallic and earthy matter. The highest water-soluble extractive value indicates the presence of more water-soluble phytoconstituents in leaves. These parameters can be used for identification and standardization of the crude drug. Preliminary phytochemical screening of plant will provide information regarding chemical nature of the plant such as presence and absence of various phytoconstituent. Aqueous and ethanolic extract of the plant shows the presence of maximum secondary plant metabolites and therefore, can be used for isolation of pure compounds for novel drug discovery purpose.

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