

IPOMOEA PES TIGRIDIS: ETHNOPHARMACOLOGY: A REVIEW**BHAVIA ROSE*K. KRISHNAKUMAR & SANDHYA S.**Department of Pharmaceutical Chemistry, St. James College of Pharmaceutical Sciences, Chalakudy
St James Hospital Trust Pharmaceutical Research Centre (DSIR Recognized), Chalakudy, Kerala**(Received on Date: 31 May 2019)****Date of Acceptance: 1st July 2019)****ABSTRACT**

Convolvulaceae known as the morning glory family is widely distributed in tropical, subtropical and temperate regions. The Convolvulaceae are mostly twining herbs or shrubs, sometimes with milky sap, comprising about 60 genera and nearly 1600 species in the world. The present study has been taken up to review one of the ethnomedicinal important plant under this family, Ipomoea pes-tigridis L. (Tiger Foot Morning Glory in English). The study documented the details of its taxonomical, phytochemical, Microanatomical study, its folk lore uses and other scientific studies that were carried out on this plant.

Key words: Plant, Phyto-chemicals, Biological act**No: of Tables: 01****No: of Figures: 01****No: of References: 20**

INTRODUCTION

Ipomoea pes-tigridis is a flowering plant of the Convolvulaceae family. This plant belongs to the family Convolvulaceae and is commonly known as "Tiger Foot Morning Glory" in English and locally known as 'Pulichuvadi' or 'Pulichuvadu' in Malayalam. It is widely distributed in tropical, subtropical, and temperate regions. It is mainly present in the regions like N.Nigeria, Tropical Africa, Australasia, Mascarene Island And Malaysia and also present in India^[1]

PLANT PROFILE

It is usually found in bush land, riverside, cultivated ground and sandy soil. *Ipomoea pes-tigridis* L. is a twining, herbaceous, hairy, annual vine. The leaves are rounded, 6-10 cm in diameter, palmately 5-9 lobed, heart-shaped at the base and hairy on both surfaces. The lobes of the blade are elliptic, with narrowed base and rounded sinuses. The 5-lobed leaf of this plant resembles a tiger's paw, which inspired its common name, as well as the botanical species name *pes-tigridis*. The flowers occur in axillary heads, usually only one opening at a time. The sepal is green, about 1 cm long; flowers are white and about 4 cm long. Flowers open in the evening and fade the next morning.^[2]

PHYTOCONSTITUENTS:

Chemical investigations of *Ipomoea pes-tigridis* species have revealed the existence of Alkaloids, Ergoline alkaloids, saponin, glycosides, Cardenolides

and Bufadienolides, Flavonoids, Tannins and Polyphenolic compounds, Anthraquinones, Cyanogenic glycosides, Carbohydrates, Fixed oils, Fats, and Volatile oils.^[3]

The characteristic of Leaf and Root powder with different chemical agents reported by Pratap et al., 2011^[4] (table 1)

TAXONOMICAL DETAILS^[5,6]

Botanical Name : *Ipomoea pes-tigridis* L.

Kingdom : Plantae

Subkingdom : Viridiplantae

Infrakingdom: Streptophyta

Superdivision: Embryophyta

Division : Tracheophyta

Subdivision : Spermatophytina

Class : Magnoliopsida

Superorder : Solanales

Family : Convolvulaceae

Genus : *Ipomoea*

Species : *Ipomoea pes-tigridis* L.

Synonyms : *Ipomoea biloba* Forsk.,
Convolvulus pes-caprae L.

Vernacular Names : Panchpatia (Hindi),
Tiger's Foot (English), Pulichuvadu
(Malayalam)

MEDICINAL USE:

The plants ipomoea pestigridis has high industrial, pharmaceutical, scientific, and cultural significance. It is used as folk medication for the treatment of hemorrhoids, diabetes, bronchitis and arthritis. This herb conventionally used by the tribes of Kerala as a single drug to treat painful conditions like headache etc, swellings, poisonous wounds and snake bites.

Roots are laxative; used for the cure of carbuncles, boils and dog-bites.

Leaves are used to treat poulticing sores and pimples, haemorrhoids, arthritis, rheumatism, dropsy, swellings, oedema, gout, venereal diseases, in boils, carbuncles and dog bites.

Petiole is used as diuretics, laxatives and pain killer.

Leaf sap is used as antidotes for venomous stings, snake bites, etc.

Seeds are used to treat stomach troubles.

Stem is used in the treatment of tumors and cancers.

Entire creeper is crushed and the juice extracted and taken orally for treatment of or prevention of rabies if bitten by a rabid dog .

The plant is used for healing wound and Leaf powder is smoked to get relief from bronchial spasm^[7]

Folklore

In Java, it is used for poulticing sores, pimples, boils, carbuncles etc. In Sri Lanka, entire creeper is crushed and the juice is given orally for treatment of prevention of rabies if bitten by a rabid dog. In India, the

plant is used for wound healing. The tribal community in Kerala state of India use the herb for various painful conditions like headaches, swellings, poisonous stings, snake bites etc.^[8,9,10]

Microanatomical study:**Anatomy Of Root:**

Well developed periderm with small fissure. Presence of starch grains and druse crystals in phloem parenchyma and cortex region. Wing shaped secondary xylem with large medullary rays. Distinct growth ring and oval or circular shape vessel elements, arrangement in solitary.

Anatomy Of Petiole:

Epidermis covered by filiform unicellular trichomes. Presence of druse crystals in collenchyma. Five vascular bundles arranged as three dorsal, two ventral and open type. Dorsal vascular bundles girdle shaped.^[11]

Anatomy of leaf**Lamina region**

Upper epidermis consists of single layered rectangular cells with cuticularized outer walls. Abundant covering and glandular trichomes were observed in this region. Covering trichomes were long, slender, unicellular, uniseriate with pointed apex and bulbous base. Glandular trichomes were sessile with unicellular head. Mesophyll region was differentiated into palisade cells and spongy parenchyma. Palisade parenchyma was found to be

single layered, compactly and radially arranged. Spongy parenchyma was found in many layers, loosely arranged with intercellular spaces. Lower epidermis was identical to upper epidermis. Chlorophyll was found in these cells. Stomata and numerous trichomes (both covering and glandular) were seen in lower epidermal region too. Epidermal peelings of leaf showed the presence of abundant cicatrix, covering and glandular trichomes.

Midrib region

Epidermal layers of lamina were continuous in the midrib region. Strip of collenchyma in 2 to 3 layers above the upper epidermis and below the lower epidermis were observed. This was followed by cortical parenchyma cells and the centre of these region arch shaped bicollateral vascular bundles was observed. Below the vascular bundles 5 to 6 layers of loosely arranged parenchyma cells with intercellular spaces were observed. Paracytic stomata and cluster crystals of calcium oxalate crystals were observed in this region.

Anatomy of stem

Transverse section of stem showed a circular shape. It was divided into the region as follows: Epidermis: It was found to be the outermost layer and was made up of single layer of cells. The outer surface of Abundant covering trichomes also were observed. Hypodermis was seen just inner to the epidermis and it consist of collenchymatic cells.

Cortex: Cortex was found next to hypodermis and it was made of thin walled parenchymatic cells arranged in several layers with intercellular spaces. Pericycle was made up of two types of cells that is, parenchymatic cells and schlerenchymatic cells in 2 to 3 layers. The schlerenchymatic cells were lignified. Next to the pericycle a single layer of wavy barrel shaped endodermis was found.

Vascular bundles: Bicollateral vascular bundles were present beneath the pericycle. Endarchmetaxylem and exarch protoxylem were seen. The central region of the stem was occupied by the pith. It was made up of thin walled parenchymatic cells with intercellular spaces. Pith contained abundant starch grains, cluster crystals of calcium oxalate and calcium carbonate crystals in the form of cystolith.

Powder macroscopy

1. pes-tigridis powder organoleptic evaluation:

For leaf:

- 1) Colour– Green
- 2) Odour– Characteristic
- 3) Taste - Bitter, astringent
- 4) Fracture - Uneven

For stem:

- 1) Colour - Light yellow
- 2) Odour - Characteristic

3) Taste – Bitter

4) Fracture - Uneven, flaky

For fruit:

1) Colour– Brown

2) Odour - Characteristic

3) Taste - Bitter, astringent

4) Fracture - uneven, flaky

Powder microscopy for leaf

Long slender, uniseriate, unicellular covering trichome with pointed apex and bulbous base were found in abundance. Rectangular calcium oxalate crystals, spiral lignified xylem vessels and polygonal shaped epidermal cells were observed throughout the powder.

Powder microscopy for stem

Lignified clustered fibres which were long and broken pieces, polygonal shaped epidermal cells with fibres, lignified spiral xylem vessels with lateral wall pits, long slender covering trichomes, isolated broken pieces of long non lignified fibres and polygonal epidermal cells were main characters which were observed in large quantities throughout the stem powder.

Powder microscopy of fruit

Non lignified isolated fibres similar to stem powder were observed even in the fruit powder. The other characters found were yellowish brown coloured endosperm, polygonal colourless parenchyma cells, covering trichomes similar to leaf and stem

powder and short slender lignified fibres with tapering ends were the major characters observed in the powder microscopy of fruit^[12]

PHARMACOLOGICAL ACTIVITY:

Anti –microbial Activity:

A. NajithaBanu, A.M. Raut and C. Balasubramanian reported the present study demonstrated that the bioengineered nanoparticles using plant resources like *I. pes-tigridis* is a better alternative to physical and chemical synthesis, since this green synthesis is pollutant free and eco-friendly. The results suggested that *I. pes-tigridis* plays an important role in the attenuation and stabilization of silver nitrate to silver nanoparticles. The particles illustrate high antibacterial activity against the multi drug resistant clinical pathogenic bacteria.^[13]

Thrombolytic Activity :

MdRabiulHossainchowdhuryetal reported the Thrombolytic Activity: Addition of 100- μ l Streptokinase, a positive control to the clots along with 90 minutes of incubation at 37°C, showed 86.3% clotlysis and mean % of clot lysis for water was found 5.69%. Clots when treated with 100 μ l of ethyl acetate and n-hexane extract of *Ipomoea pes-tigridis* showed average clot lysis 14.9% and 8.18% respectively. Among these clotlysis *Ipomoea pes-tigridis* showed minor significant clotlysis activity. So finally we can conclude that, ethyl acetate and n hexane extract of *Ipomoea pes-tigridis* showed minor significant clot lytic

properties in different blood samples. The percent clot lytic activity was compared with water (negative control) and standard enzyme streptokinase (positive control).^[14]

Cytotoxic activity:

The study on ethanolic extract of *I. pes-tigridis* against HepG2 cell line (liver cancer cell line) showed that the extract has significant cytotoxic effect at the concentration of 500 µg/ml producing 99.87% cell inhibition.^[15]

Analgesic activity:

Ipomoea pes-tigridis, is a herb traditionally used by the tribes of Kerala as a single drug remedy to treat painful conditions like headache etc, swellings, poisonous stings and snake bites. The ethanolic extract of *Ipomoea pes-tigridis*, Family: (Convolvulaceae) was evaluated for analgesic property using plate reaction time. *I. pes-tigridis* extract showed a dose dependent significant reduction of the number of writhes ($P < 0.05$) with 100 mg/kg body weight dose giving the highest reduction. The extract showed an insignificant elongation of the hot plate reaction time ($P > 0.05$).^[16]

Neuropharmacological activity:

In vivo Neuropharmacological activities of Petroleum Benzene extract of leaves of *Ipomoea pes-tigridis*^[17]

Antiacne activity and Anti - inflammatory activity

This study states that the 2% herbal hydrogel loaded with the crude methanol extract of aerial parts of *I. pes-tigridis* are effective for acne. The formulation was evaluated for various parameters like organoleptic characters, pH, skin irritation test by multiple compartment patch, microbial contamination, extrude ability, spread ability, drug content, diffusion studies using pig skin, accelerated stability studies, drug excipient interaction studies by FTIR, in vitro anti acne and in vivo anti inflammatory activity. The formulated hydrogel passed all the evaluation parameters. The hydrogel was olive green in colour and had an excellent fragrance. The diffusion studies revealed that the drug release was in controlled release form. The accelerated stability studies revealed that formulation was stable at room temperature whereas its stability reduced with increase in temperature. The FTIR studies showed that there were no drug excipient interactions. The anti acne and anti inflammatory activity showed an activity comparable to that of the standard drugs clindamycin and diclofenac, respectively. Hence it can be concluded that the formulation can be a good substitute for the existing synthetic anti acne agents.^[18]

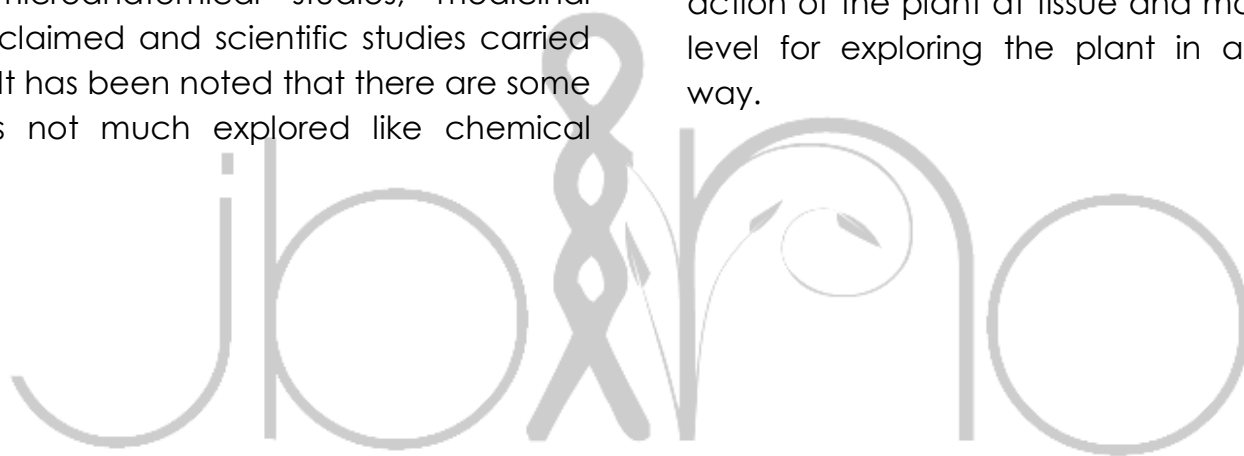
In vitro Antioxidant study

Antioxidant effect was conducted with DPPH method. The extract showed a dose dependent radical scavenging effect in DPPH assay [19,20]

Conclusion:

Ipomoea pes-tigridis L. is one of the important medicinal plants under Convolvulaceae family. The present review has brought out overall details of the plant regarding its botanical characteristics, distribution, folk lore uses, microanatomical studies, medicinal uses claimed and scientific studies carried out. It has been noted that there are some areas not much explored like chemical

characteristics of the plant with reference to its active ingredients, principle compound quantification, parameters for quality assurance of the plant etc. Even though, there are number of research reports found for in vitro cytotoxic activity (cancer cell lines) of *I. pes-tigridis*, not much reports seen for the research studies carried out in the aspects of anticancer activity through tumour induced animal model system extending to validate the safety and efficacy of the plant at in vivo level. The detailed in depth studies have to be carried out focussing on mode of action of the plant at tissue and molecular level for exploring the plant in a better way.



S.No.	Test Details	Colour observations on plant parts	
		Root Powder	Leaf powder
1	Powder + Distilled water	Light Brown	Light Green
2	Powder + 5% Aqueous FeCl ₃	Black colour	No change
3	Powder + 5% HNO ₃	No change	No change
4	Powder + N/10 Iodine solution	Brown colour	Blue colour
5	Powder + Con HCl	Dark Brown	Light Green
6	Powder + Con H ₂ SO ₄	Black	Black
7	Powder + 5% Aqueous NaOH	Light Brown	Light Green

TABLE 1: RESPONSE OF LEAF AND ROOT POWDER WITH DIFFERENT CHEMICAL AGENT.



Fig1 : Leaf

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