WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 7, Issue 10, 196-205. Review Article ISSN 2277– 7105

A REVIEW ON IPOMOEA PES-TIGRIDIS

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Article Received on
22 March 2018,
Revised on 12 April 2018,
Accepted on 03 May 2018
DOI: 10.20959/wjpr201810-12280

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ABSTRACT

Convolvulaceae, known commonly as the bindweed or morning glory family, is a family of about 60 genera and more than 1,650 species. Most of them are herbaceous vines, but trees, shrubs and herbs are also present.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). 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 variety of species in the world. The study documented the details of its taxonomical, phytochemical, physiochemical characteristics, its folk lore uses and other scientific studies that were carried out on this plant.

KEYWORDS: *Ipomoea pes-tigridis*, Tiger foot morning glory, Convolvulaceae, Ethnomedicinal value.

INTRODUCTION

Ipomoea pes-tigridis is commonly known as Tiger Foot Morning Glory in English is an annual herbaceous vine, twining, with spreading hispid axial parts, belongs to the family Convolvulaceae. This family comprises plants whose characteristics are of high industrial, pharmaceutical, scientific, and cultural significance. It is widely distributed in Sahel zone from Senegal to Niger and N. Nigeria, tropical Africa, Asia, Australasia, Mascarene Island and Malaysia. Chemical constituents include alkaloids, flavonoids, fatty acids, mucilage, resins, tannins, astringents, cardiac glycosides, saponins, resins and carbohydrates.[1-3]

The plant is well known for its wide range of medicinal properties which include purgative action, treatment of sores and pimples, haemorrhoids, arthritis, rheumatism, dropsy,

swellings, oedema, gout, venereal diseases, boils, carbuncles and dog bites, as diuretic, laxatives, pain killer, antidotes for venomous stings, snake bites, etc.[4-7]

Taxonomy of the plant

Figure 1: Ipomoea pes-tigridis L. Leaf and flower.

Ipomoea pes-tigridis Linn Stems twining, clothed with long spreading hairs. Leaves 3.8-10 cm. diam., rotundate in outline, usually more or less deeply palmately 5-9-lobed, sometimes 3-lobed or occasionally entire; lobes ovate, acute or acuminate, narrowed at the base, hirsute on both surfaces; petioles 3.8.7.5 cm. long, hairy. Flowers sessile, 3 or more in a head; peduncles 2.5-7.5 cm. long, very hairy; outer bracts nearly 2.5 cm. long, the inner about 1 cm. long, all ovate-oblong, subobtuse, very hairy. Sepals 8.13 mm. long, densely hairy and ciliate -with long stiff hairs, the 2 outer sepals broadeT than the inner, ovatelanceolate, the 3 inner linear-oblong, acute. Corolla about 2.5 cm. long, tubular.campanulate, white or pale pink. Capsules 5 mm. diam., globose, glabrous, papery, concealed in the calyx. Seeds grey-pubescent.[8-9]

Taxonomical details[10,11]

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)

Geographical Distribution

The plant is distributed in tropical, sub- tropical and temperate regions. It is distributed in Western ghat regions of India and other places. It is also found in tropical Africa and Asia.[12,13]

Plant Parts used

Leaves and Whole plant are widely used.

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[3,4,14] The tribal community in Kerala state of India use the herb for various painful conditions like headaches, swellings, poisonous stings, snake bites etc.

REPORTED SCIENTIFIC STUDIES

Histology studies

Histological characteristics and ethnopharmacognostical investigations of I. pes-tigridis has been extensively studied by Pratap et al., 2011.[15] Fresh leaves and roots of the plant were studied for their microscopical and macroscopical characteristics and their reaction with specific chemicals have been shown in Table 1. The presence of abundant calcium oxalate crystals in the cork and cortex region, simple starch grains in the cortex regions were reported. Powder microscopy revealed the presence of abundant elongated trichomes and fibers.

Table 1: Response of Leaf and Root powder with different chemical agents reported by Pratap et al., 2011.

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_2SO_4	Black	Black
7	Powder + 5% Aqueous NaOH	Light Brown	Light Green

Phytochemical studies

The preliminary Phytochemical analysis reported by Pratap et al., 2011 showed the presence of alkaloids, saponins, flavanoids and tannins in root and leaf extracts.[15]

Analgesic Activity

The study was conducted by tail flick response method and acetic-acid induced writhing in mice. The experiment showed the ethanolic leaf extract of *Ipomoea pes-tigridis* has significant activity with a dosedependent significant reduction of writhes using plate reaction time. It showed that the I. pes-tigridis extract is capable of inhibiting non-inflammatory reactions as well as inflammatory pain.[16] Analgesic and neuropharmacological effect of Ethyl acetate extract of I. pes-tigridis was carried on Albino mice by Hot plate method, Hole cross test and Open field test.[17] and these tests showed significant activities.

Antimicrobial Assay

The antimicrobial activity of I. pes-tigridis was evaluated by disc diffusion method against selective gram positive bacteria Staphylococcus aureus and Bacillus subtilis and gram negative bacteria Escherichia coli, Pseudomonaus aeruginosa, Salmonella typhi, Salmonella paratyphi and Vibrio cholera. The ethyl acetate extract and N-hexane extract of I. pes-tigridis showed prominent activity against S. aureus, B. subtilis and V. cholera.[18]

Thrombocytic activity

The ethyl acetate and n-hexane extracts of I. pes-tigridis leaves showed clot lytic activity in the controlled study conducted by in vitro method. The activity was much more significant for ethyl acetate extract than n-hexane extract.[18]

Cytotoxic activity

The ethyl acetate and n-hexane extracts of I. pes-tigridis were tested for Brine Shrimp Lethality Bioassay using brine shrimp naupli. The study showed that LC50 of the ethyl acetate and n-hexane extract is found to be 14.12 µg/ml and 33.13 µg/ml respectively.[18] 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.[19]

Chemical properties

There is no much literature regarding specific chemical constituents of *Ipomoea pes-tigridis*. However, it has been reported that Ipomoea genus has components like ergoline alkaloids, indolizidine alkaloids, nortropane alkaloids, flavonoids, glycolipids, lignin, and triterpenes. These compounds were reported for their psychotropic, uterotonic, haemostatic properties.[20]

Antiacne activity and Antiinflammatory 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.[21]

Invitro Antioxidant study

Antioxidant effect was conducted with DPPH method. The extract showed a dose dependent radical scavenging effect in DPPH assay.[22,23]

Physico-chemical, Phytochemical and Spectroscopic Characterization of *Ipomoea pes-tigridis*.

The aqueous, ethanol and petroleum ether extracts of Leaf and Stem of *Ipomoea pes-tigridis* was prepared and analyzed. Physico- chemical analysis showed the details of extractive portion of the plant and ash composition. Phytochemical Analysis revealed the presence of Tannins, Terpenoids, Glycosides and alkaloids in leaf and stem at varying concentrations. The spectroscopic studies revealed the pattern of major compounds present in the leaf and stem of I. pes-tigridis.[24]The brief information regarding phytochemical and spectroscopical data on *Ipomoea pes-tigridis* has been documented in table 2,3, 4and 5.

Table 2: Phytochemical Characteristics of Aqueous, Ethanolic and Petroleum ether extract of Leaves.

S. No	Phytochemical Tests	*I. pes-tigridis* Aqueous	*I. pes-tigridis* Ethanol	*I. pes-tigridis* Petroleum ether
1	Tannins (Lead acetate test)	+++	+	-
2	Saponnins (Foam test)	+	-	-
3	Terpenoids (Salkowsky's test)	++	+++	+
4	Cardiac glycosides (Keller-killani test)	+++	++	-
5	Flavanoids (Alkaline reagent test)	-	++	-
6	Glycosides (Fehling's test)	+++	+++	++
7	Anthraquinones (Modified borntrager's)	+	+	-
8	Proteins (Millon's test)	-	-	-
9	Alkaloids (Dragendorff's test)	+	++	-
10	Diterpenes	+	+++	-

Table 3: Phytochemical Characteristics of Aqueous, Ethanolic and Petroleum ether extract of Stem.

S. No	Phytochemical Tests	*I. pes-tigridis* Aqueous	*I. pes-tigridis* Ethanol	*I. pes-tigridis* Petroleum ether
1	Tannins (Lead acetate test)	+++	+	-
2	Saponnins (Foam test)	+	-	-
3	Terpenoids (Salkowsky's test)	++	++	+
4	Cardiac glycosides (Keller-killani test)	++	+	-
5	Flavanoids (Alkaline reagent test)	-	+	-
6	Glycosides (Fehling's test)	+	+	+
7	Anthraquinones (Modified borntrager's)	+	+	-
8	Proteins (Millon's test)	-	-	-
9	Alkaloids (Dragendorff's test)	+	+	-
10	Diterpenes	+	++	-

Note: +++ Highly present ++ Medium + Trace - Not present

Table4: Details of major peaks of the Spectrum of Ethanolic and Aqueous extracts of leaves.

Sample Name: *I. pes-tigridis* **leaf Ethanol 1/400 at 200-800 nm**		**Sample Name:** *I. pes-tigridis* **leaf Aqueous 1/160 at 200-800 nm**	
Wavelength	Absorbance	Wavelength	Absorbance
665.0	0.162	323.0	0.592
413.0	0.271	284.0	0.577
330.0	0.449	-	-
202.0	0.945	-	-

Table5: Details of major peaks of the Spectrum of Ethanolic and Aqueous extracts of stem.

Sample Name: *I. pes-tigridis* **Stem Ethanol 1/10 at 200-800nm**		**Sample Name:** *I. pes-tigridis* **Stem aqueous 1/160 at 200-800 nm**	
Wavelength	Absorbance	Wavelength	Absorbance
666.0	0.269	321.0	0.357
610.0	0.075	-	-
537.0	0.063	-	-
413.0	0.634	-	-

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, 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.

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