

Pharmacognostical and Phytochemical Investigations on *Ipomoea pes-caprae* Linn R. Br.

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Abstract

Ipomoea pes-caprae Linn is commonly used as a first aid to treat jelly-fish stings and in ritual baths to alleviate evil spirits. The leaves were used against pain, inflammation, rheumatism and as stomachic and tonic. The present study was designed to investigate pharmacognosy and phytochemistry of *Ipomoea pes-caprae* its proper investigation and chemical profiling. Powdered plant extracts were subsequently soxhleted using petroleum ether (60-80°C), methanol and water. Swaras was prepared from fresh plant extracts and studied for their phytochemical parameters and freshly prepared powder of *I. pes-caprae* was studied for its macroscopy for developing its identification parameters. Physicochemical study on *I. pes-caprae* herb yielded total ash (16.23%), acid insoluble ash (2.16%) and water soluble ash (13.48%) and value for loss on drying was (19.35%). Successive solvent extractive values of its powder were found to be 3.75 % w/w for petroleum ether (60-80°C), 5.35 % w/w for methanol and 11.45 % w/w for aqueous extract and the value for swaras was 13.25 % w/w. Phytochemical screening on extracts and swaras revealed the presence of alkaloids, flavonoids, tannins, sterols, terpenoids and glycosides. Pharmacognostic characters, phytochemical values and macroscopic characters taken together as the outcome of this study could be used as the diagnostic tools for identification and standardization of *I. pes-caprae* for its purity and authenticity.

Keywords: *Ipomoea pes-caprae*, Pharmacognostical and phytochemical parameters, Extractive values.

Introduction

Medicinal plants play an important role in the development of therapeutic agents. Due to the presence of varied constituents they exhibit diverse pharmacological actions and thus are used to treat many disease and ailments. [1]

Ipomoea pes-caprae (Convolvulaceae) also known as Do-pattilata, Railroad vine, Goat's-foot and Morning glory is a valuable medicinal plant, distributed in the tropics and subtropics which is used in folk and tribal medicines. Traditionally *I. pes-caprae* leaf juice is used as a first aid to treat jelly-fish stings [2] and in some part of India it is used in ritual baths to alleviate evil spirits. The plant is astringent and mucilaginous taste, acrid, refrigerant, somatic, laxative, diuretic and with tonic. It is useful in the treatment of skin diseases, boils, swelling, wounds, ulcer, carbuncle, dropsy, hemorrhoids, colic, flatulence, dyspepsia and burning sensation. Antioxidant [3], analgesic and anti-inflammatory [4], antispasmodic [5], antinociceptive [6, 7], antihistaminic, immunostimulator [8, 9], insulogenic, hypoglycemic [10] and antimicrobial, antifungal and antibacterial [11] activities have been reported on *I. pes-caprae*. It is also used in inhibition of platelet aggregation, diarrhoea, vomiting and piles.[12]

Although due to the large spectrum of therapeutic action, the plant is of great value, practically no pharmacognostic literature on *I. pes-caprae* is available. The present investigation therefore was aimed at developing pharmacognostical as well as phytochemical parameters for helping in proper authentication and identification of this plant.

Materials and methods

Ipomoea pes-caprae herb was collected from Indian Ocean shore of Kuttomangalam Mandaikadu, Kanyakumari District of Tamilnadu and authenticated by Botanical Survey of India, Pune with reference number: BSI/WC/Tech/09/447 and voucher specimen of herbarium file (V. No. ASIP1).

Preparation of extracts and Swaras

Freshly collected plant material was shade dried, powdered and sieved through 20 mesh size. 100 g powdered material was soxhleted with petroleum ether (60-80°C) followed by methanol. The aqueous extract was prepared from treating marc (obtained after methanol extraction) with luke warm water for 24 hrs and then filtering with filter paper. The solvent from respective extracts was

then recovered at low temperature (<40°C) under reduced pressure. Swaras was prepared by taking fresh plant material in a mixture cum grinder and grinding it well, with double distills water to convert it to pasty consistency and then straining the paste with thick cotton cloth. The extract so obtained was kept over-night after which it was decanted and dried at room temperature to get the Swaras.

Pharmacognostical studies

Macroscopic Examination: Different morphology of *I. pes-caprae* were studied for their colour, odour, appearance, taste, smell, texture and fracture etc. [13, 14]

Powder microscopy (Histochemical studies): Small amount of powder of whole herb was decolorised using chloral hydrate followed by treatment with 2% phloroglucinol HCl (1:1) for staining lignin; 5% alcoholic ferric chloride for phenolics; 2% iodine solution for staining starch grains and 60% sulphuric acid for calcium oxalate crystals. [15]

Physico-chemical parameters

Ash value and moisture content: Powder of *I. pes-caprae* was used for determination of total ash, acid insoluble ash, water soluble ash and moisture content as per standard procedure. [16-18]

Extractive Values: Extractive values of powder material were obtained using petroleum ether (60-80°C), methanol and water as solvent as per standard procedure.

Fluorescence Analysis: After treating the powder of *I. pes-caprae* with different chemicals (acids) and extracts of various solvents was subjected to the fluorescence characters and were observed under visible and UV lights as per procedure.

Phytochemical screening: For phytochemical screening, 50 g of powdered drug was extracted with petroleum ether (60-80°C), methanol and water successively and swaras was prepared by water using fresh plant material. The extracts obtained were subjected to chemical tests to establish their phytochemical profile. [19-25]

Results

Macroscopic characters are useful in proper identification of plants materials and also serve as important evaluation parameters. Leaves of *I. pes-caprae* are alternate, pinnate, elliptic, dark green, lobed/divided and glabrous, stems are flexible with new petioles having reddish hue color, creeper are green and thick, flowers are pink or purple and Funnel shaped, Fruits are round hard, seeds are dark brown, stem exudes are watery white sap, roots are large and thick (Fig. 1 & 2) (Table-1). Histochemical analysis of powder revealed the presence of stomata, starch grains, lignins, phenolic compounds and calcium oxalate crystals (Fig. 3, 4, 5 & 6). Total ash, acid insoluble ash, water soluble ash and loss of drying were found and reported (Table-2). The powder of *I. pes-caprae* was

evaluated for extractive values and observation recorded (Table-3). Fluorescence analysis of *I. pes-caprae* powder subjected to chemical reagents in presence of day light and short (254 nm) and long (365 nm) UV lights was presented (Table-4). Fluorescence analysis of *I. pes-caprae* extracts and swaras was performed in day light, short (254 nm) and long (365 nm) UV lights and observation recorded (Table-5). Phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, steroids, terpenoids and resin glycosides in the crude extracts of the *I. pes-caprae* (Table-6).

According to World Health Organization (WHO), the macroscopic and microscopic description of a medicinal plant is the first step towards establishing its identity and purity. [26] Keeping in view of the ethnopharmacological importance of *I. pes-caprae*, preliminary studies were undertaken for its identity and standardization. Organoleptic evaluation is a technique of qualitative evaluation based on the study of morphological and sensory profiles of whole drug. [27] Ash value is not only useful in determining authenticity and purity of drug but it is important quantitative standards. Total ash value of *I. pes-caprae* was relatively low, which may be due to low content of carbonates, phosphates and silica. Fluorescence is an important phenomenon exhibited by various chemical constituents present in the plant. Some constituents give fluorescence in the day light where VU light produces fluorescence in many natural products (e.g. alkaloids like berberine), which do not fluorescence in day light. [28]

Table: 1 Macroscopic characters of *Ipomoea pes-caprae*

Part morphology	Observation
Leaves	Alternate, Pinnate, Elliptic, Dark green, with divided lobes, Glabrous
Stems	Flexible, New Petioles with reddish hue
Creeper	Green, Thick
Flowers	Pink or Purple, Funnel shaped
Fruits	Round, Dry and Hard
Seeds	Dark Brown
Roots	Large, Thick

Conclusion

Although *I. pes-caprae* possessing many bio-actives which is used for caring many diseases and it also possesses many other pharmacological properties, there is no record on pharmacognostical work on this plant. The present work was

Table: 2. Physiochemical parameters of *Ipomoea pes-caprae*

Parameter	Percentage
Total ash	16.23 % w/w
Acid insoluble ash	2.16 % w/w
Water soluble ash	13.48 % w/w
Loss of drying	19.35 % w/w

therefore undertaken to develop some pharmacognostical parameters that can be used for its identity and purity. The studies provided information in respect to identification, chemical profiling and physicochemical characters which may be certainly useful for

proper identification and standardization of *I. pes-caprae* which is a valuable plant.

Further studies are in progress on this plant in order to isolate, identify, characterize the bio-actives and to elucidate their structure.

Table: 3. Values of extracts and swaras of *Ipomoea pes-caprae*

Solvent	Nature	% Extractive value
Petroleum ether (60-80 ⁰ C)	Oily mass	3.75 % w/w
Methanol	Sticky mass	5.35 % w/w
Aqueous	Non sticky mass	11.45 % w/w
Swaras	Sticky mass	13.25 % w/w

Table: 4. Fluorescence analysis of powder of *Ipomoea pes-caprae*

Treatment	Day light	Short UV light (254 nm)	Long UV light (365 nm)
Drug powder (as such)	Light Green	Light Green	Dark Green
Drug powder + Water	Light Green	Dark Green	Emerald Green
Drug powder + Conc. HCl	Light Yellowish	Pale Green	Dark Green
Drug powder + Conc. H ₂ SO ₄	Brownish	Light Green	Dark Green
Drug powder + Conc. HNO ₃	Light Yellowish	Brown	Green
Drug powder + Acetic acid	Green	Dark Green	Dark Green
Drug powder +10% NaOH	Dark Brown	Light green	Dark Green
Drug powder + 10%HCl	Green	Dark Green	Dark Green
Drug powder +10% H ₂ SO ₄	Yellowish	Light Green	Green
Drug powder +10% HNO ₃	Brown	Light green	Green
Drug powder + 10% acetic acid	Yellowish	Light Green	Green

Table: 5 Fluorescence analysis of extracts and swaras of *Ipomoea pes-caprae*

Extracts	Day light	Short UV light (254 nm)	Long UV light (365 nm)
Petroleum ether	Brown	Dark Brown	Black
Methanol	Tar Brown	Light Brown	Dark Brown
Aqueous	Coffee brown	Light Brown	Black
Swaras	Light Brown	Dark Brown	Black



Table: 6 Phytochemical screening of extracts and swaras of *Ipomoea pes-caprae*

Phytoconstituents	Test	Pet. ether	Methanol	Aqueous	Swaras
Alkaloids	Mayer's reagent	-	+	+	-
	Wagner's reagent	-	+	-	+
Lipids	Solubility test	+	-	-	-
	Filter paper test	+	-	-	-
Glycosides	Borntrager's test	-	-	-	-
	Keller Killani test	-	+	-	-
Tannins and Phenols	Ferric chloride solution	-	+	+	+
	Lead acetate	-	+	+	+
Flavonoids	Lead acetate test	+	+	+	-
	Alkaline test	-	+	+	+
Steroids	Salkowski reaction	+	-	-	-
	Liberman Burchad reagent	+	-	-	+
Saponins	Foam test	-	-	-	-
	Heamolytic test	-	-	-	-
Terpenoids	Salkowski reaction	-	+	-	+
	Noller's test	-	+	+	+



Fig.1 Photograph of *Ipomoea pes-caprae*



Fig.2 Photograph showing A Twig with flower (dry herb)

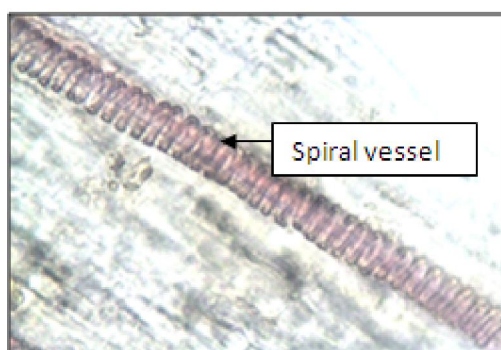


Fig. 3 Photograph showing spiral vessel

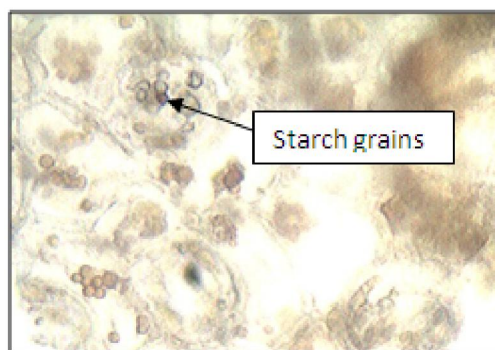


Fig. 4 Photograph showing starch grains



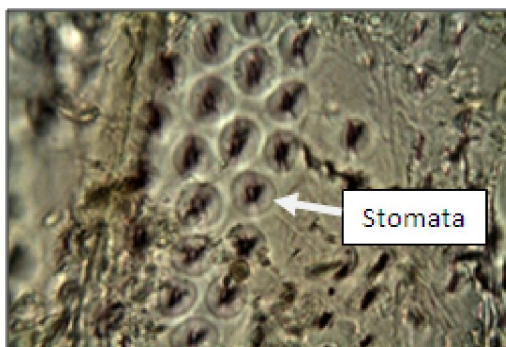


Fig. 5 Photograph showing stomata

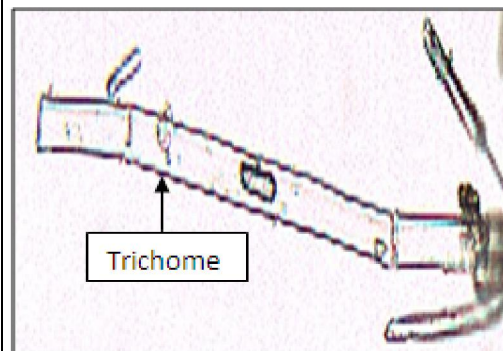


Fig. 6 Photograph showing A part of Trichome

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