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Research Article

EVALUATION OF PHYSICO-CHEMICAL STANDARDIZATION PARAMETERS OF *SOLENA AMPLEXICAULIS* LEAF

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ABSTRACT

Solena amplexicaulis, commonly called as the creeping cucumber, belongs to the family Cucurbitaceae. Traditional it is used as astringent, appetizer, carminative, cardiogenic, digestive, diuretic, expectorant, invigorating, purgative and stimulant. This plant also has antioxidant, antidiabetic and antibacterial action. The leaves showed potent anti-inflammatory activity. The present study was carried out to establish physico-chemical parameters along with preliminary phytochemical screening of petroleum ether, chloroform, methanolic and aqueous extracts of *Solena amplexicaulis* leaf. Preliminary phytochemical screening of various extracts revealed the presence of carbohydrate, alkaloids, flavonoids, sterols, phenolic & tannins compounds. The physico-chemical parameters such as total, water soluble, acid insoluble and sulphated ash (2.2, 1.9, 1.17 and 1.3% w/w respectively) and loss on drying (10.0 % w/w), extractive values, foaming and swelling index were studied. These studies will be helpful in developing standards for quality, purity and sample identification of this plant.

Keyword: Standardization, *Solena amplexicaulis*, physicochemical and phytochemical.

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INTRODUCTION

Solena amplexicaulis is a scandent dioecious perennial herb with several spindle-shaped tuberous roots which are 1.5-2 cm in diameter and with slender branched furrowed, stems bearing simple tendrils; Leaf-stalk slender, 4-10 mm, finely velvet-hairy at first, becoming hairless after some time. Leaf blades are very variable may be polymorphous, ovate, suborbicular, oblong or narrowly lanceolate in shape, 3-5 angled or lobed, lobes are lathery, usually cordate at base, reticulately veined beneath, margins remotely denticulate, oblong-lance shaped, lance shaped, or triangular, 8-12 × 1-5 cm, below densely bristly or almost hairless, above densely bristly or scabrous, base heart-shaped, margin entire or toothed, tip blunt or tapering. Flowers are small and yellow in color. Male flowers are umbellate or subumbellate, flower-cluster-stalk is very short, apically with 10-20-flowered. Flower-stalks are 2-8 mm in length, calyx tube about 3-5 mm in length and about 3

mm in diameter. Flowers are yellow or yellow-white in colour, petals are triangular in shape, 1-1.5 mm in size, tip of petals are blunt or pointed, filaments are thread-like, about 3 mm in length. Female flowers are usually solitary, flower-stalk is about 2-10 mm in length, finely velvet-hairy, calyx and flower of female flower is same as male flowers. Ovary is ovoid in shape, 2.5-3.5 × 2-3 mm in diameter, stigmas are 3 in number. Fruit is red-brown in colour, broadly ovoid, oblong, or nearly spherical in shape, 2-6 × 2-5 cm in size. Seeds gray-white or gray-brown in colour, nearly round or ovate in shape, 5-7 × 5-6.5 mm in size and smooth or slightly tuberculate. The flowering month for the plant is from May to August. For the standardization and quality assurance purpose, we make an attempt for the standardization of *Solena amplexicaulis* leaf by carrying out its pharmacognostical studies¹⁻⁵.

MATERIALS AND METHODS

Plant Material: The leaves of *Solena amplexicaulis* were collected from the hills of Chamoli, Uttarakhand in the month of August 2017 and authenticated by Dr. Rajeev Soni, Botanist and Head, Nirmal Institute of Medicinal and Aromatic Plant Studies, Indore, M.P. The plant material (1kg) was air-dried at room temperature (30-40°C) and then powdered to pass through a sieve of 1mm and further subjected to various studies.

Chemical and Reagent: All the chemical and solvents used for the study were of analytical grade and all methods were taken from official methods.

Physicochemical Parameters: The physicochemical parameters such as percentage of total ash, acid-insoluble, water soluble and sulphated ash, loss on drying, extractive values, foaming index, swelling index, crude fibre and heavy metal were determined according to official methods for quality control of medicinal plant⁶⁻¹¹.

Preliminary Phytochemical Screening: The preliminary photochemical screening was carried out on

extracts obtained after successively extraction with petroleum ether, chloroform, methanol and aqueous solvents. The dried extracts were treated for the presence or absence of phytoconstituents¹²⁻¹⁴.

RESULTS AND DISCUSSIONS

Physico-chemical Parameters: The various parameters such as total ash, acid insoluble ash, water soluble ash, sulphated ash, loss on drying were established and shown in Table 1. The extractive values by successive extraction method and colour change of extracts, in visible and UV light are summarized in Table 2.

Table 1: Ash values and loss on drying of *Solena amplexicaulis* leaf

S. N.	Evaluation parameter	Value (% w/w)
1	Total ash	2.2±0.453
2	Water-soluble ash	1.9±0.068
3	Acid-insoluble ash	1.17±0.427
4	Sulphated ash	1.3±0.211
5	Loss on Dying	10.0±0.014

Value: % w/w ± S.E.M.; n=3

Table 2: Extractive value (percentage yield) and colour of *Solena amplexicaulis* leaf extracts

Solvents used	Percentage yield	Colour of extract		
		Visible light	254 nm	365 nm
Petroleum ether	1.2±0.04	Yellowish	Greenish	Greenish
Chloroform	2.9±0.03	Yellowish Brown	Brownish	Yellowish black
Methanol	5.75±0.02	Greenish Brown	Brownish Black	Black
Water	6.54±0.08	Brownish Green	Brownish Black	Black

Value: % w/w ± S.E.M.; n=3

Quantitative studies: The other quantitative studies for foaming index and swelling index were performed. The swelling index of tasted samples was found to be less than 1 and the foaming index of tested samples was found to be less than 100.

Crude and heavy metal analysis: Heavy metals in *Solena amplexicaulis* leaf samples were analyzed. The percentage crude fibre and the presence of heavy metal are tabulated in Table 3.

Table 3: Concentration of heavy metals and percentage of crude fibre in *Solena amplexicaulis* leaf

Heavy metal	Concentration (ppm)
Arsenic	0.0254
Iron	0.1939
Copper	0.0147
Zinc	0.0336
Lead	0.0057
Cadmium	0.0009
Mercury	0.0217
Cobalt	0.0131
Crude fibre (%)	7.3%

Preliminary phytochemical studies: The preliminary phytochemical screening of *Solena amplexicaulis* leaf extracts were performed for various phytoconstituents. It revealed the presence of different phytoconstituents, like carbohydrates, alkaloids, glycoside, phenolic & tannins, flavonoid, protein & amino acid and sterols in different extracts. Results are shown in Table 4.

CONCLUSION

From ancient time, plants having specific therapeutic property, desirable action, easy availability with less toxicity. The scientists from past few decades are keen and sincere to evaluate many ethno medicinally used plants. The leaf of *Solena amplexicaulis* is still traditionally used in treatment of various disorders by many populations. The physicochemical evaluation of this plant gives the idea about identification and standardization of the plant. It is also important in long term study of plant to evaluate the medicinal and therapeutic action of this plant.

Table 4: Preliminary phytochemical screening of *Solena amplexicaulis* leaf extracts

Test	Pet. Ether extract	Chloroform extract	Methanol extract	Aqueous extract
Carbohydrate				
Molish' reagent	-	-	+	+
Fehling solution	-	-	+	+
Benedict solution	-	-	+	+
Alkaloid				
Mayer' reagent	+	+	-	-
Dragondroff' reagent	+	+	+	-
Hager' reagent	+	+	-	-
Glycoside				
Killer Killani	-	-	+	-
Sod. nitroprusside	-	-	-	-
Phenolic and Tannin				
FeCl ₃ Solution	-	+	+	+
Lead acetate solution	-	+	+	+
Sterols				
Salkowski reaction	-	+	+	-
Hesse's reaction	-	+	+	-
Flavonoid				
Ammonia solution	-	+	+	+
Shinoda test	-	+	-	+
Saponin				
Foam test	-	-	-	-
Protein and Amino acid				
Ninhydrin test	-	-	+	+
Millon's reagent	-	-	+	+

+ = Present; - = Absent

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