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Pharmacognostic Evaluation and Phytochemical Screening of an Unexplored Herb: *Thalictrum Foliolosum* DC

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Ethnomedicinally, the roots of Thalictrum foliolosum DC has long been used traditionally in opthalmia as a collyrium, improves eye-vision, relieves toothache, in diarrhea, cure piles to god extent, nail troubles, and also in discoloration of the skin. Because of lack of proper identification of plants, standardization of crude drugs becomes difficult. So, to ensure efficacy, safety and purity of T. foliolosum, there is a requirement to create quality control parameters by using pharmacognostical and phytochemical screening. To perform evaluation of pharmacognostical parametrs including organoleptic, microscopical and physico-chemical and phytochemical screening of T. foliolosum roots. Methods: organoleptic and microscopical characters of dried sample of root were observed. Physico-chemical parameters performed by applying WHO guidelines, fluorescence analysis and phytochemical screening of root sample were also completed for standardization and identification of root of T. foliolosum. Macroscopical characters like color, odor, shape, texture, size, fracture were observed from root and powdered root material of T. foilolosum. Microscopical characters of root showed the presence of parenchymatous cells, cork cells along with pitted and sclariform vessels. Phytochemical evaluation specified the presence of various secondary plant metabolites like alkaloids, steroids, saponins, proteins, tannins, flavonoids and triterpenoids. Physico-chemical parameters such as extractive value, Moisture content, ash value, florescence behavior of root powder was performed. These all evaluated parameters help to distinguish the powdered drug material. This current study will help in standardization and identification along with carrying out further research in herbal medicinal system.

Keywords: Alkaloids; Ethnomedicinal; Pharmacognostical; Phytochemical; Secondary Plant.

The medicinal herbal plants play a vital role in the health care of mammal and human beings. A huge proportion of people of the developing country still reliable on herbal practitioners and plants for their healthcare needs[1]. The plants are also the source of various things for human beings not only for medicines but also for food and shelter. Since the disease, decay and death coexisted with life, the early man had to think about illness and its treatment at the dawn of the human intellect[2]. Plants are used as source of medicines by mankind to treat diseases since 2000 years ago[3]. Regardless of many advancements in the field of medicines, plants still remain the main source of drug not only in Ayurveda but also in modern medicines. Almost 12,000 plants are known to have medicinal properties out of 248, 000 identified species of higher plants[4]. Studies of plants continue principally for uncovering novel secondary metabolites or phytochemicals derived from plants exhibiting protective functions for human beings[5]. It becomes necessary action to assure the

identity of plant and check its quality before use[6]. The Standardization process is achieved through Pharmacognostic studies which contributes to the identification and authentication of a plant material. Most Pharmacopeias and regulatory guidelines recommend macroscopic and microscopic studies along with chemicalbehavior of herbal materials forstandardization and quality control[7].

T. foliolosum DC commonly known as Mamira, pilijari belongs to family Ranunculaceae[3]. The genus thalictrum is an abundant genus with almost 200 species found in South America, Asia, Africa, North America and Europe[4]. In the traditional system of medicines, 14 species are used as the substitute of coptis[5]. The plant parts like rhizome and roots of*T. cultratum, T. foiolosum, T.glandulosissimum var. chaotungense,T. finetii,* and *T.baicalense* are rich in berberine, which needs further studies[6].Thalictrum is an herbaceous perennial flowering slow growing, damp forming plant a tradional herb which also found wildly in the forest region of eastern and western india. It is a sub erect, tall prickly herb, heavily branched which rise upto 0.9-1.2 m in height[7]. Stem is smooth branched (1.2-2.4m) glabrous and pale in colour due to this reason also known as pilijari[8]. Leaves are exstipulate, pinnately decompound, petiole-sheaths auricled. Leaflets 4-6 mm, rarely 25 mm, orbicular. Panicles much-branched, bracts small. Flowers polygamous, white, pale green, dingy purple. Sepal counts 4-5 while petal 0. Stamens many, filaments filiform, anthers beaked. Ovule 1, pendulous. Achenes usually 2-5, small, oblong, acute at both ends, sharply ribbed.Traditionally *T.foililosum* was used to clears the brain, have purgative action, used in opthalmia as collyrium, recovers eye vision, cures the toothache, given in acute diarrhea, provide relief in piles also effective in discoloration of skin and nail troubles. The root hasstimulant and aperient properties and has been found useful in convalescence after acute disease, in mild forms of intermittent fevers, and in atonic dyspepsis. In india and Afghanistan, roots are largely used as an anjan, or application of opthalmia[3].

Phytochemical evaluation on *T.foliolosum* shown the presence of following secondary metabolites Alkaloids, saponins, triterpenes, Phytosterols, Phenolic compounds and carbohydrates[9,10]. Several Pharmacological activities of *T. foliolosum* has been reported antiproliferative, antioxidant[11]and shown antibacterial action (*Pseudomonas aeruginosa, Candida albicans*, *Escherichia coli*, and*Staphylococcus aureus),* antilipid peroxidation[12]inhibit DNA topoisomerase IB of *Leishmania donovani*[13], antimalarial[14,10]. So, in the currentstudy we make an effort for standardization of*T. foliolosum*DC. to perform the organoleptic, microscopy, physico-chemical and preliminary phytochemical analysis of root was done.

MATERIAL AND METHODOLOGY

Authentication and Plant Material

T. foliolosum DC root collected from Shimla in the November month 2020, it wasauthenticated and identified by National organization, Botanical Survey of India, Dehradun under voucher specimen of plant (No. 380) submitted at the herbarium for future reference.

Pharmacognostical evaluation

Organoleptic evaluation

The WHO quality control methods were followed for the organoleptic evaluation of *T. foliolosum* DC root. The parameters colour, odour, taste, shape and size of root were evaluated.[16-18]

Microscopic evaluation

Section preparation

The transverse section of the root was cut by using sharp blade. Then section was cleared, stained with the staining reagents (Phloroglucinol and Conc. HCL) and placed on slide. The cellulosic and lignified cells and tissues were identified by various different staining techniques.[16]

Powder microscopy

The procedures mentioned in Khadelwal book of Pharmacognosy was followed for the Powder microscopyof the root powder[16].

Physico-chemical analysis

As per the WHO quality control methods the parameters such as moisture content, Ash value and extractive values were determined[17].

Phytochemical Analysis

Pet. ether, chloroform, methanol and water extracts of *T. foliolosum* DC were subjected to qualitative screening of various plant constituents like alkaloids, tannins, glycosides, flavonoids, volatile oils, and steroids according to procedures of Khandelwal.[16,18]

Preparation of extract

Roots of *T. foliolosum* DCwere shade dried at about 20-25 °C and made powdered. Weigh 100 g of powdered root and subjected to Soxhlet extraction, successively, using petroleum ether, chloroform, ethanol and water. After completion of extraction, filtered the extracts and concentrated using rotatory evaporator.

Fluorescence behavior of the powdered drug

Place the dry powder of root on a watch glass and add few drops of different chemical reagents. For the florescence behavior of drug, detect the changes in color by placing the watch glass under visible and UV light.[16,19]

RESULTS

Pharmacognostical evaluation

Organoleptic and Microscopic evaluation

The organoleptic chacateristics of root shown in the Table 1. The transverse section of root of *T. foliolosum DC.* shown the presence of periderm, cortical parenchyma, elongated cortical cells along with paranchymatous pith.

The powdered material of rootobservedbrown in color, showed pieces of lignified pitted vessels, parenchyma, cork cells, scalariform vessels (Figure 2).

Physicochemical evaluation

Under Physicochemical evaluation, various parameters of root powder like Loss on drying, extractive value, ash value were determined. The water soluble ash, acid soluble ash, and total ash along with toluene soluble, petroleum ether soluble, chloroform soluble, ethyl acetate soluble, alcohol soluble and water soluble extractive values were shown in Table 2.

Preliminary Phytochemical screening

The preliminary phytochemical screening of the extracts viz. chloroform, ethyl acetate, ethanol and water was performed and the results obtained shown in Table 3.

Table 1. Organoleptic Characters of root

Parameters	Results
Color	Outer surface is brownish and inner surface is yellowish
Odour	Strong aromatic
Taste	Bitter
Shape	Branched, elongated, cylindrical and contorted
Size	8 - 15 cm long and 0.5 - 2.0 cm in diameter

Fig. 1. Leaves and roots of *T. foliolosum*

Florescence analysis

The behavior changes of powdered drug with different chemical reagents were determined both UV and Visible Light and it is reported as shown in Table 4.

Table 2. Physico-chemical parameters of *T.foliolosum* root powder

	Parameters	Mean[n] (% w/w)
Ash value	Total Ash	1.9%
	Acid insoluble Ash	0.12%
	Water soluble ash	1.02%
Extractive value	Toluene	3%
	Chloroform	1.8%
	Ethyl Acetate	4%
	Acetic Acid	36%
	Methanol	12%
	Water	33 %
Loss on drying	———	4.66%

n = 3; * dry weight basis

DISCUSSION

For the quality assurance of herbal medicines, proper control of initial material is

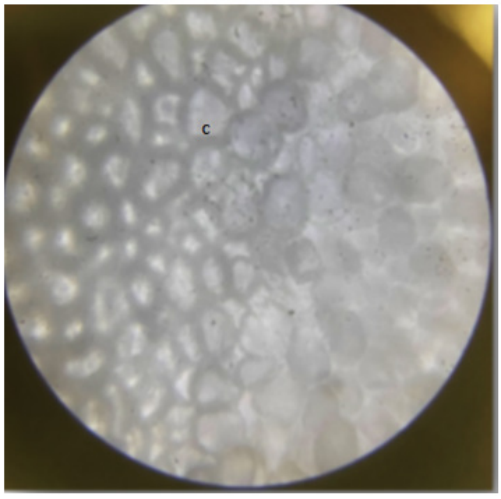

Fig. 2A. Microscopic view of T.S of *T. foliolosum,* C- *Cortical parenchyma.*

Table 3. Phytochemical Parameters of *T.foliolosum* root powder

S.No	Phytochemicals	Extracts			
		Pet ether	Chloroform	Methanol	Water
1.	Steroids	+	-	-	-
2.	Saponins	-	-	+	+
3.	Anthraquinone Glycosides	-	-	-	-
4.	Alkaloids	-	+	+	+
5.	Proteins	-	-	+	+
6.	Tannins	-	-	+	+
7.	Flavonoids	-	+	+	+
8.	Fixed oils	-	-	-	-
9.	Volatile oils	-	-	-	-
10.	Cardiac glycosides	-	-	-	-

Table 4. Flourescence analysis of *T. foliolosum* root powder

Solvent used	Visible Light	UV Light	
		At 254 nm	At 366 nm
1N NaOH	Brownish	Grey	Black
Distilled water	Brown	Brown	Black
1N HCL	Greyish brown	Green d	Dark green
50% HNO3	Brown	Greenish brown	Dark green
Fecl3	Bluish black	Bluish yellow	Bluish black
Picric acid	Yellowish brown	Yellowish green	Pale green
CHCL3	Pale brown	brown	Dark brown

necessary. Authentication is one of the primary important step towards ensuring the initial material. Therefore, standardization of medicinal plants has been rapidly increased in few past years. While modern techniques are accessible, but still identification of medicinal crude materialsare more reliable on pharmacognostic studies[16]. In this regard, the macroscopic and microscopic characters of the root of ……. have been evaluated. Macroscopic characters of the root of the plant can serve as a diagnostic parameter. Microscopical studies and powder analysis of the root revealed the presence of cork cells, lignified pitted vessels, scalariform vessels, and parenchymatous cells. Moreover, these results also helpful to identify the adulteration of this plant when its powder form

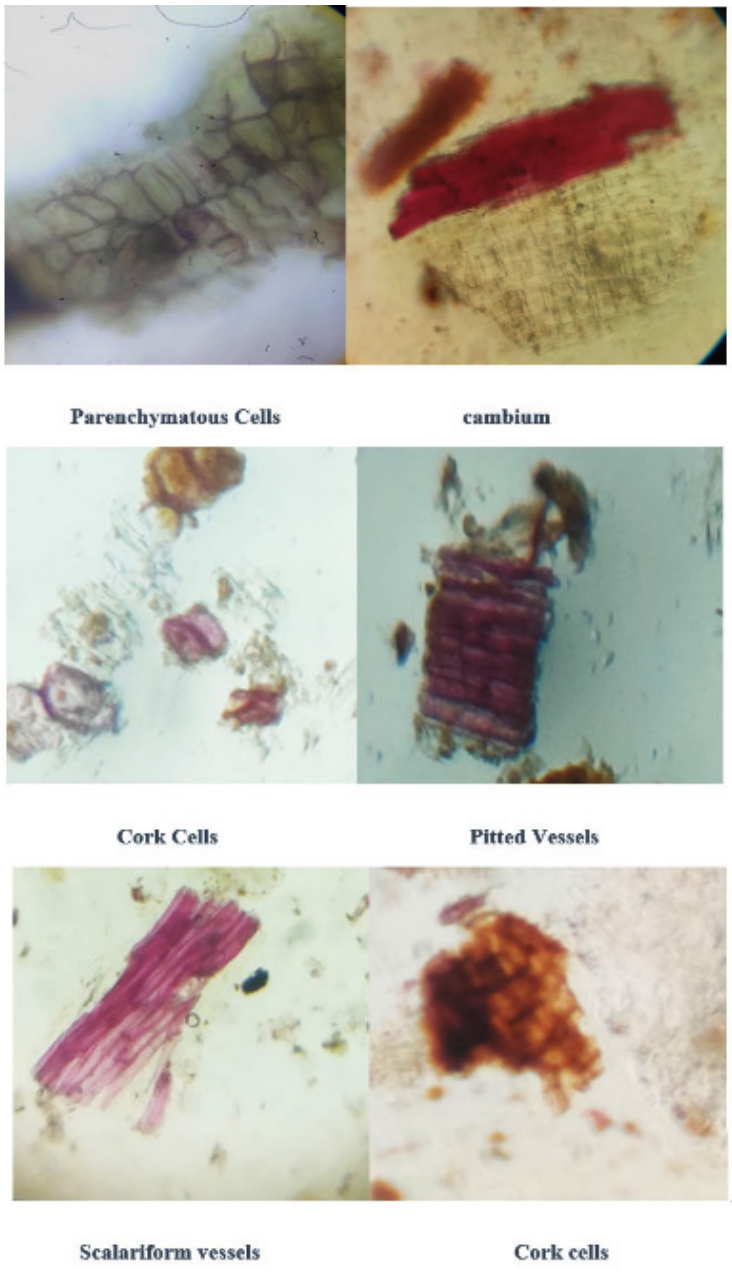

Fig. 2B. Powder Microscopy.

is available[17]. Further, to judge the quality and purity of herbal drugs, determination of physico-chemical parameterscontributes an important role. Taking into consideration the diversity in chemical nature and content of drugs, various solvents used for the determination of extractive values. In the current study the extractive value for acetic acid was highest followed by water.The earthy matter or inorganic components and other impurities present within herbal drug determined by ash value. The phytochemical examination of different extracts viz. Pet ether, chloroform, methanol and water were evaluated and it showed the presence of alkaloids, flavonoids, tannins, proteins and saponins.

CONCLUSION

The findings of present study would help the researchers to authenticate the medicinally important plant *T. foliolosum*. Pharmacopeia standards for the plant can be established by using the results of microscopiccharacters and physicochemical parameters determined in the present study.Various Pharmacognostic aspects of root of *T. foliolosum* was studied and described along with phytochemical and physicochemical parameters that can be utilized in further isolation and purification of medicinally important compounds.Thus, keeping in view the current study on *T. foliolosum* serve as a reliable tool to supplement information in regard to its identity/ authentication from its allied species.

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Conflict of interest

No conflict of Interest.

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