

Research Article

Physico-Chemical and Phyto-Chemical Study of Rhizome of *Dryopteris cochleata*

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ABSTRACT

The pteridophytes constitute the primitive vascular plant groups which are found spread all over world including India. *Dryopteris cochleata* is a fern belongs to the family Dryopteridaceae is considered to possess great medicinal value. It has been reported to possess wide ethanomedical use. The investigation carried out by us was on the Pharmacognostical, Physiochemical and Phytochemical aspects of the rhizome part of the plant. Morphological studies of rhizome showed the presence of various diagnostic characters. Moisture content, Ash value and extractive value were determined for quality standard of drugs. During the experimental work the rhizome part showed the presence of various phytoconstituents like flavonoids, tannins, protein and amino acid etc.

Keywords: Pteridophytes , Dryopteridaceae, Phytochemical, Moisture content, Flavonoids.

INTRODUCTION

Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness. Traditional medicine using herbal drugs exists in every part of the world. The major areas are Chinese, Indian and European traditions. The philosophies of these traditional medicines have some resemblance to each other but differ widely from modern Western medicine. In view of the progress of Western medicine not only new synthetic drugs but also herbal drugs have to fulfill the international requirements on quality, safety and efficacy. Herbal drugs have the advantage of being available for patients in the geographical area of the special traditional medicine. The development procedure of herbal drugs for world-wide use has to be different from that of synthetic drugs¹.

Medicinal plants are of great importance to the health of individual and communities. The medicinal value of these plants lies in some chemical active substances that produce a definite physiological action on the human body. The most important of these chemically active (bioactive) constituents of plants are: alkaloids, tannins, flavonoid and phenolic compounds. Many of these indigenous medicinal plants are also used for medicinal purposes².

Out of 1,200 species of pteridophytes occurring in India, about 170 species have been found to be used as food, flavor, dye, medicine, bio-fertilizers, oil, fiber and bio-gas production³. Ethnobotany and medicinal properties of Indian fern and their allies have been described by various workers time to time⁴⁻⁸. Likewise 160 species of useful pteridophytes in India on the basis of phytochemical, pharmacological and ethnobotanical studies have been reported⁹. An overview on medicinal uses of 110 Indian pteridophytic has been published¹⁰. *Dryopteris cochleata* that belongs to the family Dryopteridaceae is considered to possess great medicinal value. It has been reported to possess wide ethanomedical use, whose rhizome has antifungal property and is used as an antidote. It also has variety of applications against the disorders like epilepsy, leprosy, cuts, wounds, ulcers, swelling, pains and snake bites. The decoction of the dried rhizome, stem and stripe is used for blood purification¹¹. The leaves of the plant are used for the treatment of epilepsy¹²⁻¹³. Pounded rhizomes are used in swellings and pain and have antifungal properties¹⁴. A small portion of the rhizome of the plant is powdered and taken with water twice a day in rheumatism, epilepsy and leprosy¹⁵. *Dryopteris cochleata* is used in mental disorder. Filtered water extract

of rhizome is given to the unconscious persons suffering from epilepsy in India¹⁶.

MATERIALS AND METHODS

Plant Selection

The rhizome part of *Dryopteris cochleata* was collected from Amarkantak forest district Bilaspur, Chattisgarh, in the month of July 2013. It was further identified and authenticated by the Botanical Department, Saifia Science College, Bhopal, Madhya Pradesh, Ref no. 476/Bot/Saf/13. The rhizomes were washed with tap water, prior to distilled water, shade dried and powdered. The powdered plant materials were subjected to successive extraction with methanol using Soxhlet extractor. The extracts were dried and stored in freezer at 0 °C for future use.

Macroscopic study

The rhizome was taken for various macroscopic organoleptic evaluation like colour, odour, shape, taste, appearance etc.

Microscopy Study (Wallis T E, 2002):

Qualitative microscopic evaluation was carried out by taking transverse sections of fresh rhizome of *Dryopteris cochleata*. Free hand transverse sections of rhizome were first observed with distilled water and then with phloroglucinol and concentrated HCl.

Physicochemical parameters

The determination of various physicochemical parameters such as total ash, acid insoluble

ash, water soluble ash, water soluble extractive value, alcohol soluble extractive value, moisture content, pH were calculated as per Indian Pharmacopoeia.

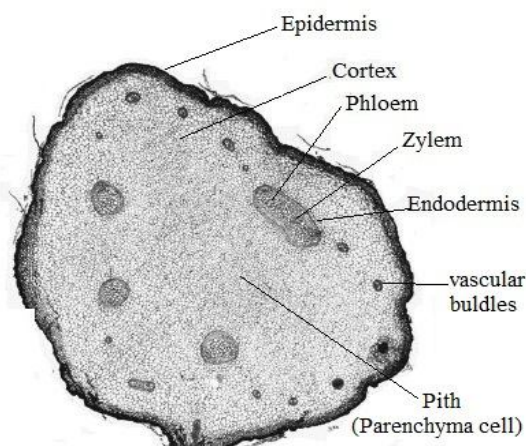
Preliminary phytochemical screening of rhizome of *Dryopteris cochleata*

For preliminary phytochemical screening, 100 g of powder drug was extracted with Methanol. The mother extract obtained from successive solvent extraction were then subjected to various qualitative chemical tests to determine the presence of various phytoconstituents like glycosides, tannins, phytosterols, fixed oils and fats, proteins and amino acids, flavonoids, saponins, etc. The above phytoconstituents were tested as per the standard methods¹⁷⁻¹⁸.

RESULT AND DISCUSSION



Dryopteris cochleata rhizome



T.S of *Dryopteris cochleata* rhizome

Macroscopy of rhizome of *Dryopteris cochleata*

The macroscopic character were always served as useful keys in faster and early identification of plant material and also serves as an important standardization parameter. The macroscopic features of rhizome of *Dryopteris cochleata* are described here. The organoleptic evaluation is discussed in Table no.1.

Microscopy of T.S. of rhizome of *Dryopteris cochleata*

The rhizome show the outermost surface, a single-layered barrel shaped epidermal cells embedded with tannin content. The outer cortex consisting of a few layers of cells with lignified thick walls and inner cortex made up of several layers of parenchyma cells with thin cellulose walls. Vascular bundles are loosely distributed around the perimeter of a central pith. The xylem vessels possess ligneous secondary wall thickenings. The remainder of the rhizome vascular system is scattered in small bundles throughout the cortex. Pith is composed of parenchymatous cells containing starch grains and few filled with oleoresinous contents.

Physicochemical parameters

To evaluation of physicochemical parameters gives a clear idea about the specific characteristics of crude drugs under examination, besides it's macro-morphological or cyto morphological characters, microscopical natures in both its entire and it's powder form. While these diagnostic features enable the analyst to know the nature and characteristics crude drugs, further evaluation of different parameters indicate their acceptability by criteria other than the morphological characteristics. The procedures normally adopted to get qualitative information about the purity and standard of a crude drug include the determination of various parameters. The determination of physico-chemical parameter is important in determination of adulterants and improper handling of drugs. Table- 2 shows the result of various physico- chemical parameter of powdered drug carried out using standard methods.

Phytochemical Analysis of rhizome of *Dryopteris cochleata*

The results of preliminary phytochemical analysis are tabulated in Table 3. The phytochemical study revealed the presence of various phytochemicals in methanolic solvent extract.

Table 1: Organoleptic Evaluation of rhizome of *Dryopteris cochleata*

S. No.	Organoleptic Parameters	Result
1	Colour	Brown
2	Odour	Aromatic
3	Taste	Astringent
4	Surface	Rough with striations

Table 2: Physical Evaluation Parameters

S. No	Parameter	Values(%)w/w
1	Loss on Drying	8.45
2	Ash Values	
	Total Ash	9.10
	Acid insoluble ash	4.87
	Water soluble ash	6.18
3	Extractive Values	
	Water soluble extractive	11.6
	Alcohol soluble extractive	20.4

Table 3: Phytochemical analysis

S. No.	Name of the Phytochemical	Qualitative Test	Result
1	Carbohydrates	Molisch's test	-
		Fehling's test	-
2	Alkaloids	Mayers test	-
		Wagners test	-
3	Proteins & Amino acids	Ninhydrin Test	+
		Millon's Test	+
4	Tannin and Phenolic compound	FeCl ₃ Test	+
		Lead acetate Test	+
5	Flavonoids	Shinoda Test	+
		Alkaline reagent Test	+
6	Fixed Oils & Fats	Spot Test	-
		Saponification Test	-
7	Phytosterol	Salkowski Test	-
		Liebermann's Test	-
8	Glycoside	Keller-Killiani Test	+
9	Saponin	Foam Test	-

CONCLUSION

All studied standardization parameters such as macroscopy, microscopy, physicochemical parameters, and phytochemical screening was carried out and it could provide the knowledge in authentication of *Dryopteris cochleata* rhizome. Phytochemical screening results will be useful to find out the genuine drug. Physicochemical parameters such as Loss on drying, Total ash, Acid insoluble ash, Water soluble ash, and Successive extractive values were observed with solvents of Alcohol, Aqueous. These values can be useful to detect adulteration. This report would help in the identification of the crude drug in future.

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