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## Diversity of medicinal pteridophytes in Shevaroy hills of Eastern Ghats, South India

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**Abstract**

In this study, we provide a comprehensive data of the ethnomedicinal uses of some ferns from Shevaroy Hills of Tamil Nadu. Based on these data, the documented therapeutic potential of ferns is analysed to highlight the gaps in our knowledge that deserve further investigation and can also be used as a starting point in the development of new drugs. Literature reports of ethnomedicinal uses of ferns were collated based on published work from scientific journals, books, reports and online databases. A total of 35 species are reported to be used as ethnomedicines. Each of these important species has been reported in the primary literature more than 50 times. Further research targeting the individual ingredients responsible for the pharmacological effects and their mechanisms of action is needed. These studies will further support the therapeutic potential of medicinal fern species for their future clinical applications in modern medicine.

**Keywords:** Pteridophytes, ethnomedicine, shevaroy hills, therapeutic literature

**1. Introduction**

Pteridophytes are the vascular cryptogams, flourished well during Devonian Mississippian and Pennsylvanian periods of the late Paleozoic can easily regarded as the "Age of Pteridophyta". Pteridophytes (fern and fern allies) comprise more than 10,000 species throughout the world and are roughly distributed among 305 genera. 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 production<sup>[1]</sup>. The economic importance of Pteridophytes is well known. Theophrastus (327-287 BC) and Dioscorides (50 AD) had referred the medicinal attributes of certain ferns. The ferns had an important role in folk fore. These plants have been successfully used in the Ayurvedic, Unani, Homeopathic and other systems of medicines as well as in the human history. Pteridophytes are used by the physicians in Unani system of medicine<sup>[2]</sup>.

In Chinese system of medicine, many Pteridophytes are prescribed by local doctors<sup>[3]</sup>. Later on modern biological and pharmaceutical studies were carried out on pteridophytes by different workers. Dixit and Vohra<sup>[4]</sup> reported edible and medicinally important pteridophytic species from India. Kaushik<sup>[5]</sup> emphasized on the ethnobotanical importance of ferns from Rajasthan state of India. The ethnobotanical uses of this unique group are of immense importance<sup>[6, 7]</sup>. The most important studies on food and medicinal values of pteridophytes were conducted by Nayar<sup>[8]</sup>, Hodge<sup>[9]</sup>, Dixit<sup>[10]</sup> and Dixit and Bhatt<sup>[11]</sup>. Recently, Ghosh *et al.*<sup>[12]</sup> reported some edible pteridophytes as vegetables and medicines. Different parts are used as a medicinal value like rhizome, stem, fronds, pinnae and spores for treatment of various diseases.

Many numbers of publications are seen in different fields like taxonomy, ecology and cytology of pteridophytes but only a hand full of reports are available regarding the medicinal properties and uses. A comprehensive list of Indian pteridophytes has been prepared by Dixit<sup>[13]</sup> and Chandra<sup>[14]</sup>. The ecological studies on the ferns of Palni hills have been worked by Manickam and Ninan<sup>[15]</sup>. There is a need for further evaluating efficacy and safety of commonly used ethnomedicinal Pteridophytes. Ethnobotany and medicinal properties of Indian fern and their allies have been described by various workers time to time. In this context, the present study has been made to explore the Ethnomedicinal uses of some Pteridophytes from Shevaroy hills used for the treatment of various diseases.

**2. Methodology**

The Shevaroy hills is a major hill range at the southernmost point of the Eastern Ghats of South India and are situated in Yercaud, Salem district of Tamil Nadu (Figure-1), lies between 11° 45' and 11° 55' N and 78° 10' and 78° 20' E and covers an area of 470km<sup>2</sup><sup>[16, 17, 18]</sup>.

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This charming Hill station is resorted to by a large number of visitors as a sanitarium and being especially more suitable for those suffering from rheumatism, heart and lung complaints. The climate is extremely healthy, especially for children and epidemics of typhoid and small-pox are unknown. The humidity ranges between 65% and 87% in a year. The range temperature in between 13 °C (December) and 30 °C (May). Hand book to the ferns of British India, Ceylon and Malay Peninsula <sup>[19]</sup> and Pteridophytic Flora of the Western Ghats-South India <sup>[1]</sup> were the basic books referred for identification of the collected plants. Each and every specimen were critically identified with help of available literature, study of the plant parts like rhizome, scales, hairs, spores and vein

under the microscope and they were determined. The specimens collected during exploration were made into herbarium specimens and identified by comparing with standard herbarium specimens available at Center for Plant Biodiversity, St. Xavier’s College (Autonomous), Palayamkottai and with an expertise available in the Department of Botany of that Institution when needed and Botanical Survey of India, Southern Circle, Coimbatore district. The ethnomedicinal uses of Pteridophytes were collected based on published work from scientific journals, books, reports and online databases and also from local people who residing forest lands in the study region.



Fig 1: Location of study area (The Shevaroy hills)

### 3. Enumeration and Result

The present study gives a brief account of 35 Pteridophytes (Figure 2 & 3) used for ethnomedicinal purpose by local people of Shevaroy hills. Their botanical name and uses are given below:

#### 1. *Lycopodiella cernua* (L.) Pic. Ser.

It is cultivated as an ornamental plant in the Philippines. In Malaysia, decoction of the plant is used as a lotion in beri-beri and also for coughs and uneasiness in the chest. An embrocation of the ashes in vinegar is recommended for skin eruptions [1].

#### 2. *Selaginella involvens* (Sw.) Spring

Plant is used to rejuvenate life, also used in the prolapse of rectum, prevents cough, bleeding piles, gravel amenorrhoea and as an antibacterial [20, 21].

#### 3. *Equisetum ramosissimum* Desf.

It has diuretic, hemostatic, haemorrhagic, antirheumatic, antifungal and antiviral properties. Powdered stem dissolved in water is used for enema during stomach disorders in children. Paste of branches with some other leaves is used as local application for the treatment of fracture and the dislocation of bones [4, 22, 23].

#### 4. *Psilotum nudum* (L.) P. Beauv.

It is used as a purgative and the herb juice showed antibacterial activity against *Micrococcus phyogenes* and *Pseudomonas nerugionsa*. The oil spores are given to infants to arrest diarrhea [1].

#### 5. *Botrychium lanuginosum* Wall. ex Hook. & Grev.

Plant is anti-dysenteric and antibacterial, some species are used as a good vulnerary [21].

#### 6. *Ophioglossum reticulatum* L.

It is used as a cooling agent and in the treatment of inflammations and wounds. Fleshy fronds are eaten as vegetable curry and also used as a tonic [4, 21, 24].

#### 7. *Angiopteris evecta* (Forst.) Hoff.

Leaf extract is used in the treatment of dysentery. Spores are effective in the treatment of leprosy and other skin diseases. The rhizomes are used for Scabies in India [4, 25, 26].

#### 8. *Lygodium microphyllum* (Cav.) R.Br.

The slender graceful fern is cultivated in gardens to cover pillars and bowers. The young leaves are eaten and decoction of the leaves is given in dysentery. It is used in many lotions. Leaves are applied in the form of poultices for skin diseases and swelling [1].

#### 9. *Pteris vittata* L.

The plant extract is used as demulcent, hypotensive, tonic, antiviral and antibacterial [21].

#### 10. *Actinopteris radiata* (S.W.) Link.

Plant is bitter having the properties like styptic, anthelmintic, astringent sweet, loosing, serve conditions of kapha and pitta, diarrhea, dysentery, helminthiasis, haemostasis and fever [27].

#### 11. *Cheilanthes farinosa* (Forsk.) Kaulf.

Roots are used to treat eczema and stomachache, fronds are used to treat menstrual disorders [28].

#### 12. *Cheilanthes tenuifolia* (Burm. f.) Sw.

Rhizome and roots are used by tribals as a general tonic. The Santhals tribes prescribe a preparation from the roots for sickness to witchcraft or the evil [24].

#### 13. *Ceratopteris thalictroides* (L.) Brongn.

The plants are used as poultice in skin complaints and in China as tonic and styptic. Fresh leaves are used as vegetable curry. Also it is used in ploughing as green manure in rice fields [4, 21].

#### 14. *Hemioitis arifolia* (Burm.) Moore.

The fronds are used in the treatment of aches and as vermifuge. Crushed juice from the fronds is used for burns and earache [4].

#### 15. *Adiantum caudatum* L.

Fronds extract is effective in wound healing. It is used in skin diseases, diabetes, cough and fever [27, 29].

#### 16. *A. lunulatum* Burn

Leaf and root decoction is used for the treatment of chest complaints. It is also used in blood related disease and in fever due to elephantiasis. Fronds are burnt with oil and applied to itch [8].

#### 17. *Pteridium aquilinum* (L.) Kuhn v. Deck

Rhizome is astringent, anthelmintic and is useful in diarrhoea and inflammations. Decoction of rhizome and fronds is given in chronic disorder of viscera and spleen. Rhizome is boiled in oil and is made into an ointment for wounds. It is also woven into the foundation shape of wreaths and floral decorations. The green fronds are used as fodder [4, 22, 30].

#### 18. *Odontosoria chinensis* (L.) J. Sm.

It is used internally for chronic enteritis. It is used to produce red dye. The leaves contain syringic acid and vitexin [4].

#### 19. *Nephrolepis auriculata* (L.) Trimen

Tubers are edible and decoction of the fresh frond given in cough [4, 31].

#### 20. *Hymenophyllum javanicum* Spr.

The dried fern mixed with garlic and onions is sometimes smoked by the local people to cure headache [1].

#### 21. *Dicranopteris linearis* (Burm. F.) Underwood

Rhizome is used as anthelmintic. Fluid extracted from fronds shows antibacterial properties. Fronds are used as an ingredient for making local beverages [4, 31].

#### 22. *Christella parasitica* (L.) H. Lev.

It is used in the treatment of gout and rheumatism [1].

#### 23. *Asplenium nidus* L.

Root stock is considered good for fever and elephantiasis, used as an emollient in cough and chest diseases. Leaf is smoked to cure cold [4, 21, 32].

#### 24. *Asplenium polyodon* G. Forster

The plant is used in enlargement of the spleen, incontinence of urine, calculus, jaundice and malaria [1].

#### 25. *Asplenium polyodon* G. Forster var. *bipinnatum* Sledge

Plant is anti-cancerous. The fresh crosiers paste prepared on



granite is applied to the tumors <sup>[1]</sup>.

**26. *Diplazium esculentum* (Retz.) Sw.**

Young leaves are cooked as vegetables. Decoction prepared from rhizome and young leaves is used for hemoptysis and cough <sup>[6]</sup>.

**27. *Dryopteris cochleata* (Buch. Ham. ex D. Don) C. Chr.**

Whole Plant extract is given twice daily orally in case of snakebite. Plant paste is also applied on the bite wound to prevent infection. A small portion of powdered rhizome is taken with water twice daily in rheumatism, epilepsy and leprosy <sup>[20, 21, 33]</sup>.

**28. *Dryopteris sparsa* (Buch. Ham. ex D. Don) Kuntze**

Plant is used as an anthelmintic <sup>[27]</sup>.

**29. *Tectaria wightii* (Clarke) Ching**

Plants are considered anthelmintic <sup>[4]</sup>.

**30. *Tectaria coadunata* (J. Sm.) C. Chr.**

Young fronds are used as vegetable curry or as salad; extract from fresh rhizomes is used for preventing diarrhoea in

children <sup>[4]</sup>.

**31. *Hypodematium crenatum* (Forssk.) Kuhn**

The plant used to cure gynecological disorders. Rhizome is used as an antibacterial agent <sup>[34]</sup>.

**32. *Blechnum orientale* L.**

Rhizome is used as an anthelmintic, eaten during scarcity of food, as cure for intestinal worms, bladder complaints <sup>[4]</sup>.

**33. *Pyrrhosia lanceolata* Farewell**

A decoction of the fern is used for curing cold and sore throat. A tea prepared from the fronds is used for itch <sup>[1]</sup>.

**34. *Drynaria quercifolia* (L.) J. Sm.**

The rhizome bitter, it is used in the treatment of typhoid fever, cough, diarrhoea, ulcers and inflammations. It is very specific in the treatment of migraine <sup>[4, 26]</sup>.

**35. *Marsilea minuta* L**

Plants are used in cough, spastic condition of leg muscles, etc. The leaves and sprouts are cooked as vegetables <sup>[4, 26]</sup>.







#### 4. Conclusion

Numerous plants used in folk remedies are considered efficacious by today's standards and some have been accepted as main sources of drug discovery. However, the modern use of ferns in medicine, as for other lower plants, is neglected and thought to be only of minor and local significance. From the present study it is noted that, Shevaroy hills of Eastern Ghats harbor vast diversity of medicinal Pteridophytes. Some of the species are very common and few of them are restricted to particular region. Now a days the species of Pteridophytes are facing threats due to increasing urbanization, unplanned developmental activities, and adverse climatic change, anthropogenic activities like tourism, expansion of roads and most of the herbal practitioners nearby area are collect Pteridophytes from the study area due to their great medicinal importance. Hence, conservation of Pteridophytes is must to maintain the diversity by developing a fern conservatory or fern garden so that the rare/ endemic species of ferns should be protected from over exploitation and destruction in the study area. The tissue culture is a very useful technique for the mass multiplication of the plant species in a short time and hence, researches focusing on developing a protocol for *in vitro* regeneration of ferns should be encouraged.

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