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Medico-Folklore Study on Some Pteridophytes from Kerandimal Hills of South Odisha with Emphasis on *Drynaria quercifolia* (Linn.)J. Smith.

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ABSTRACT

Therapeutic data pertains to pteridophytes are extremely meager. The medico folklore use of such plants took an emerging trend of research due to presence of important phytochemical potential used as source for preparation of medicaments. The study was conducted during 2010–2013 in the Kerandimal regions encompassing Ganjam and Gajapati districts of south Odisha. The data so collected through interviews with well-structured questionnaire to aboriginals and tribal's (informants) of the localities, were taken into account. The reported 08 species were under 08 genera and 07 families of pteridophytes with focused medico-folklore use amongst which *Drynaria quercifolia* of family Polypodiaceae, a new report from south Odisha itself, found with highest therapeutic claim. However, some of the enlisted plants also found to be of multifaceted use *i.e.* as food, aesthetic and ornamental, mythological iconic and somewhere as protection from reptiles *etc* apart from their therapeutic uses. In view of massive exploitation including destruction of habitat, the species tends to be endangered and hence conservation of it, being suggested.

Keywords: Medico-folklore use; *Drynaria quercifolia*; Kerandimals; Conservation.

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INTRODUCTION

Phytogeographic survey of literatures of South Odisha revealed that enough study has been undertaken pertains to therapeutic use of angiosperms. However, study on cryptogams with special reference to Pteridophytes, was least explored though many pteridophytes constitute the dominant vegetation coupled with economic importance prior to that of angiosperms. Puranic literatures reiterate on such report, was of about 250 million years as old.

Irrespective of the use of Pteridophytes in Ayurveda, Unani, and Homoeopathy system of medicine [1] along with other varied importance in folklore medicine; this group of plants has been much overlooked; rather neglected. On the contrary, the presence of variety of phytochemicals such as alkaloids, flavonoids, steroids, poly phenols, glycosides etc reported from this group of plants justify their use as a potential source for preparation of medicaments against different ailments. Reports on pteridophytes from south Odisha (Kalahandi, Koraput, Gajapati and Raygada) revealed 44 species, in Vasundhara project report (2011-2012) [2]. Our present survey in Ganjam and Gajapati districts (Kerandimal Hills) of South Odisha revealed 08 Pteridophyte species amongst which *Drynaria quercifolia* of family Polypodiaceae, a new report from south Odisha itself found with highest therapeutic claim.

Initially the plant was reported to be therapeutically inert [1]. Later, the whole plant was reported to be used against tuberculosis, hectic fever, dyspepsia and cough [3]. Also, the pounded fronds were used as poultice over inflammatory regions [4]. The macerated paste of rhizome was applied on forehead, relieves headache [5]. The whole plant reportedly used as anthelmintic, expectorant, pectoral in treatment of chest and skin diseases; loss of appetite i.e. dyspepsia [6]. Even if the roots said to be used as bitter tonic act astringent to the bowels during typhoid fever as per Ayurvedic concept, some medico folklore reports highlighted on it to be used against phthisis and hay fever [7].

METHODOLOGY

South Odisha (Figure: Map) comprises 8 districts like Ganjam, Gajapati, Raygada, Koraput, Nawrangpur, Malkangiri, Kandhamal and Kalahandi with diversified physiographic status. This southern part of the state extends from coastal plains to interior hilly regions of Eastern Ghats comprising Mahendragiri hills identified with tributaries like Mahendratanya and Banshadhara Rivers mostly spread over and contributing to Raygada and Koraput districts; whereas, Kerandimals constitute the immediate region of Eastern Ghats adjacent to Coast of Coromondal comprising Ganjam and Gajapati districts. The region constitutes plateaus; enriched with tributaries like Rushikulya, Bahuda and Ghodahada rivers and interior mountainous areas of Kerandimals. The hill tops and the plateau are found to be with vegetation comprising deciduous, dry deciduous, to the extent few moist deciduous i.e. ever green flora intermingled with terrestrial cryptogrammic land species. The peculiarity is that along with other pteridophyte species, there is sporadic occurrence of a newly reported pteridophyte named *Drynaria quercifolia* (here in after *Dq*) identified with the lives of most tribal, aboriginals dwelt in those regions. During our expedition it became very difficult to come up to the reach of this plant community because of its habitation at higher altitudes in hill tops, so risky and in exploitable. However, with the help of two old guys, we could reach different spots and found the species contributing a lot to the public health of the region; thereby, it became a most medico economic species of the tribal people inhabiting in the area. Occasionally in the rural and urban areas for quenching their financial economy they deal the species through financial transaction. However, the other pteridophytes were also found to have medicinal properties; but, the species *Dq* undoubtedly possess more medico folklore utility compared to others.

To establish and verify the fact, a well-structured questionnaire based on standard norms prescribed [8], was prepared pertaining to availability, ecology, economic transaction and the various medico folklore uses with the percentage contribution of the species to the economic viability of people dependant on it. To get information, survey was conducted in various places exclusively in Ganjam and Gajapati districts. The names of the villages included were Chikiti, Tamana, Kamalapur, Pudamari of Ganjam to Luhagudi, Mohana, Gundriguda, Amlaguda, Ladruma, Betarsing, Khani, Kamiliguda, Chapadapanka, Dhepalanju, Brahmanigaon and Chandragiri areas of Gajapati districts spread through Kerandimals of South Odisha. These spots were included in the survey based on prior information gathered regarding use of small lower plants as medicine. The study was conducted during the year from 2010–2013 in the Kerandimal regions encompassing Ganjam

and Gajapati districts of south Odisha. The folklore use of the species found in the tone of the locals and quacks were inconformity with the various uses in the reported literatures. However, to make these reasonably explained the data so collected through on site interviews on different pteridophytes with focus on the plant *Dq* were summarized systematically as here under (Table-1).

Table 1: Medico folklore data recorded in Kerandimal regions of South Odisha on *Dq*

Sl.No	Part used	Dosage form	Type of use	Ailments recovered
1	Rhizome	20gm pounded with water (50ml) mixed with black piper (<i>Piper nigrum</i>)berries = 1 dose	Internal use orally twice a day.	diarrhea
2	Rhizome	10-15gm macerated with cow milk = 1dose.	Internal use	Abdominal – renal colic pain relief
3	Rhizome	Aqueous extract prepared from grounded rhizome (50gms), made to volume 250ml/vol.	Orally administered once or twice daily for two days.	Hectic and intermittent fever
4	Rhizome and sterile fronds	Macerated to paste	External application on scalp	Remove Baldness and hair falls
5	Rhizome along with <i>Atropa belladonna</i> .	Macerated paste	Externally applied as poultice (bandaged)	Anti-inflammatory setting of fractured bones
6	Rhizome	Hot aqueous extract	Internal use	Removes cough and acts as expectorant
7	Rhizome	Macerated paste	External application	Quickened Wound healing
8	Whole plant	Clean and dried pieces	Masticator	Cures bleeding gums and toothaches etc.
9	Whole plant	Not revealed	Internal use	Cardiac tonic, peptic ulcer, birth control
10	Rhizome	Dried rhizome powder 20gms twice daily for 1month	Internal use	To remove impotency

Field trips were arranged with field kit containing vasculum, polythene bags, camera, pen and diary for maintaining field notes: ecological, morphological, reproductive status, phyto associations and medico folklore use etc, to the area under study. The field visits of the selected villages and hill tops of Kerandimal were covered thrice in each year with an expectation of getting both the phases of the life cycle (sporophytic and gametophytic) during July to December for three consecutive years (2010-13) at least for a period of 3-4 days in each visit. The local tribal guides were consented earlier for the purpose. Local herbal healers, vendors, quacks and elderly people were identified as source information which was collected during the expeditions to the desired spots. The plants so collected were brought to the laboratory for processing of the herbaria in one way and processing of the plant materials for extraction of the phytochemicals as well. The various ecological surroundings enriched with this plant species were snapped and accomplished (Plate: 2 & 3).

Later the herbarium so prepared were showered with naphthalene powder and stored in genus/species flaps (cover files) and arranged in herbarium cabinet of the college museum (Plate: 1). At a stretch a set of six herbaria (Lectotype) were prepared out of which three were kept for the purpose of project thesis and two were sent to Central National Herbarium, Botanical Survey of India, Howrah for final certification, although the initial authentication was made by Prof. S. K. Dash, Head, P.G. Department of Biosciences, CPS, Berhampur at Mohuda. The herbarium slip was made in the chronology of: Collection No. / Date; Botanical Name; Family; Local Name; Locality / Altitude; Features (Geographic / Ecological / Morphological); Reproductive season; Authentication-Preliminary/ Final; Collector's name. On the whole, the entire procedure pertains to field collection and herbarium techniques were followed based on standard treatise [9].



Fig: Map of Study Area



Plate 1: Herbarium of *Drynaria quercifolia*



Plate 2: Photographs from the habitats: (A) Growing on rocks (petriphytes); (B) Growing on trees (arboriphytes).



Plate 3: Illustrated Phytography of *Drynaria quercifolia* (Linn.) J. Smith

RESULTS

The medico folklore uses of the Pteridophyte species from the area were enumerated with Botanical name, family (in parenthesis), popular (vernacular) name, plant parts and their uses. The present survey provided information on 08 species under 08 genera and 07 families. Out of the 08 species one belongs to the family Polypodiaceae which was a new report from South Odisha. Some of the enlisted plants were found to be used as food, beautification purpose, mythological beliefs and protection from reptiles etc. apart from their use as a medicinal plant. The list of Pteridophytes with their medicinal utility reported from Kerandimal hills of Ganjam- Gajapati districts of South Odisha were as follows:

***Actinopteris radiata* (Sw.) L. (Actiniopteridaceae); Morpankhi**

Whole plant acts as astringent and anthelmintic; used against severe irritations of helminthiasis including diarrhea, dysentery, *kapha* and *pitta*, fever etc with children.

***Adiantum caudatum* L. (Pteridaceae); Mayur Shikha**

Extracts prepared from fronds of the plants were used in healing of wounds. Rhizomes are used as anthelmintic and also used against Cough and fever.

***Drynaria quercifolia* (L.) J. Sm. (Polypodiaceae); Ashvakatri / Goruda Pakshini**

The decoction of whole plant normally used by locals in typhoid fever and the fronds were useful in poulticing swellings. Rhizomes also alone were used in treatment of typhoid, hectic fever dyspepsia and cough. Tender shoots were shade dried, powdered and mixed with root powder of Ashok (*Saraca asoca*) plant in 1:1 ratio and administered with one glass of milk after dinner for 15 days for one week to generate strength and sexual vigor.

***Dryopteris cochleata* (D. Don) C.Chr. (Dryopteridaceae); Kakolisag/Kandadhenu**

Whole plant extract was given orally twice daily to patients suffer from snakebite. Powdered rhizome is taken with water twice daily in rheumatism and leprosy. Rhizome is antifungal and applied on spots of swellings, pains and ulcers; also, taken before meal that cures colic pain due to amoebic dysentery.

***Lygodium flexiosum* (Linn.) Sw. (Lygodiaceae); Kala mahajala**

The plant was used as an expectorant and its root extract along with mustard oil was considered effective external liniment remedy for the treatment of wounds and eczema. Leaf paste applied over the effected skin for remedy. Macerated paste of the fronds applied to conjoin fractured bones. Powdered root (2g) compounded with *Piper nigrum* (1g) in 100 ml of water were orally administered twice daily for 3 days to check bloody fax. Rhizome boiled with mustard oil was locally applied on carbuncle and in the treatment of rheumatism, sprains, scabies and ulcers. Aqueous rhizome extract was used for the treatment of sex abused affections. One teaspoonful of plant juice given for internal use twice daily relieves fever.

***Pteris quadriaurita* Retz. (Pteridaceae); Bhanjabasa**

Plants used as antihelmintic. Decoction of fresh rhizome and fronds were given in chronic disorders arising from obstructions of viscera and spleen. Leaf juice (10ml) along with fresh Date palm (*Phoenix sylvestris*) toddy (200 ml) for five days internal use, early in the morning before sunrise and in the evening after sunset in empty stomach, normalizes menstrual cycle.

***Marsilea minuta* Linn. (Marsileaceae); Sunisunia**

Leaves fried with cow ghee, taken internally to overcome insomnia; also increases memory, induces sedation. Plants were used against cough and bronchitis, cramp of legs and thigh muscles. Tender leaves were crushed to extract the juice and 2 drops of juice twice daily as nasal drop acts effective remedy in migraine. Fresh plant paste (10g) mixed with curd (100g) prepared from black skinned cow's milk. The dosage was given orally once a day in empty stomach for one month against epilepsy.

***Selaginella tenera* Hook. & Grev. (Selaginellaceae); Sanjivani**

Dried plants were used as diuretic; also, used in treatment of gonorrhoea affections and against hallucination. Dosage form was not revealed properly by the source informant and hence unascertained.

DISCUSSION

Traditional knowledge is restricted and amenable only to a specified locality. Ethno botanical surveys like attempts gather information regarding utilities of plants and bring it to the lime light. It is highly significant when medico folklore data so collected, complements in discovering novel drugs. It also provides information for biodiversity conservation and other biological utilizations of the species as well. The present survey revealed 08 Pteridophytes belonging to 7 families and 8 genera from Kerandimal tribal areas of Ganjam and Gajapati districts of South Odisha. The plants found under study with their medicinal utilities were verified with available literatures [10-16]. A new species *Drynaria quercifolia* (Linn.) J. Smith was reported from the locality, mostly used for different ailments with mythological, horticultural and as protectant against snakes and other reptiles though the other species were found with few ethno-medicinal information. The collected herbals were claimed to be with high efficacy; however, it entails detail clinical evaluation for establishing better amenability of such ethno therapeutic reports. In this locality local health tradition exists due to regular practice of quacks mostly using these plants for treatment of stomach ache, peptic ulcers, diarrhea and dysentery like gastro-intestinal disorders; wound, abscess, eczema and scabies like skin problems; cold, fever, cough, jaundice, snake bite, urinary complaints, fracture of bones, hypertension, glandular swellings and used as a tonic for vigor etc. As mentioned above, patients were advised to take these plants as decoction, juice extract, paste and powdered forms either drawn of single plant or preparing mixtures taking other ingredients in the formulation.

As the medicinal value is highly acclaimed, further study for its scientific validation became the need of the hour. Moreover, the over exploitation; rather, destruction of habitat making the plants endangered and hence their conservation has been drawn attention [17]. Keeping the above features in view, their documentation were given due importance for preservation of the medico folklore data and their conservation as well.

Plant profile of the selected Pteridophyte species *Drynaria quercifolia* (Linn.) J. Smith

Taxonomic status

The herb pertains to the present study can be contemplated systematically under general classification as follows:

Systematic position

Kingdom	: Plantae
Division	: Cryptogams
Subdivision	: Pteridophyta
Class	: Pteridopsida
Order	: Polypodiales
Family	: Polypodiaceae
Genus	: <i>Drynaria</i>
Species	: <i>D. quercifolia</i>

Vernacular names

English: Basket fern/ Rock cap fern; Sanskrit: Ashvakatri; Oriya: Garuda Pakshini; Kui: Belantandin; Hindi: Kankali; Marathi: Basingh/ Wandurbashing; Malayalam: Pannakilhannumanavala ; Bengali : Barur

Nomenclatural citation: [18-21]

Type genus: *Drynaria* (Bory) J. Smith in Hooker J. Bot. 4: 60 (1841) *nom. cons.*; Genus-*Polypodium*; Subgenus- *Drynaria* Clarke, Trans. Linn. Soc. Lond. II (Bot.) 1: 555 (1825); Hope, J. Bombay Nat. Hist. Soc. 15:89 (1903); Type Species: *Drynaria quercifolia* (Linn.) J. Smith, J. Bot. 3: 392 (1841); J. Bombay Nat. Hist. Soc. 15: 89 (1903); *Polypodium quercifolia* Linn. Negi *et al*, New York Sci. Jour. 2009.

Ecology and habitat

The species is commonly known as 'Basket fern' with its Sanskrit name 'Aswakatri' and local name 'Goruda Pakshini' in Odia. The plant is of sporadic occurrence in Kerandimal hills of South Odisha. As reported earlier the species is indigenous to tropical Africa, South Asia, East Asia, Australia and Oceania. In the present habitat the species is located in two conditions as either epiphytic growing on arboreal species (Plate -2B); or epipetric *i.e.* growing on rocks in an ascending fashion especially in wet environments of the forest areas surveyed (Plate-2A). During our survey in the month of April and then in September followed by trips subsequently fetched the plants with reproductive features. However, the gametophytes (prothallus) could hardly be traced in nearby areas like crevices and shallow regions of the forest nearer to the species. Nevertheless, it may be apprehended a vulnerable state of the plant due to the sporadic occurrence of its gametophytes, as to in the long run, may question of its survival and hence become in endangered status.

Phytography of *Drynaria quercifolia* (Linn.) J. Smith

It is a large creeping somewhat fleshy dictyostelic rhizome closed by numerous dark brown lanceolate or pseudopeltate scales known as paleae with dentate margin; deciduous and composed of glandular cells with very short stalks. Leaves dimorphic as in one are sessile, bract like chordate with oblong base and margins pinnately lobed; stiff, clasping the rhizome tightly acting as humus collectors with lamina oblong pinnatifid and persistent all through. The second foliage found, having stout brownish winged petiole measuring up to 2ft long; clinging the rhizome as dry brown and hard structure with prominent rachis (midrib) and lateral veins;

lamina measures up to 3ft, pinnati-partite with each segment linear with a broad base and tapering apex, margin entire-repand. On drying lamina segments being articulated to the midrib were dropped out leaving aside stout petioles on rhizomes. Venation reticulate, petiole grooved on adoxial surface and bulged on abaxial side. Fronds with sori were found within ecological range of study.

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