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Ethnomedicinal studies on some pteridophytes of Similipal Biosphere Reserve, Orissa, India

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Investigations had been made on medicinal values of higher plants but pteridophytes are often ignored. In spite of the luxuriant growth of these plants in and around Similipal in Mayurbhanj district of Orissa, northern India, they had not been studied taxonomically or ethnobotanically. The dominant tribes involved in using pteridophyte as medicines in the district are *Santhal*, *Kol*, *Bhumija*, *Bhuyan*, *Mahalis*, *Sounti* and *Saharas*. The plant parts, viz. leaves, roots, rhizomes and fronds were used in raw or cooked forms for the treatment of malaria, gonorrhoea, leprosy, rheumatism etc. Mostly used genera are *Adiantum*, *Asplenium*, *Lygodium* and *Pteris*. The present study had been designed to assess the medicinal uses of 33 pteridophyte species belonging to 21 families on the basis of field surveys and taxonomic identification of plants.

Key words: Ethnomedicinal, pteridophytes, similipal biosphere reserve, Orissa.

INTRODUCTION

All systems of traditional medicine have their roots in folk medicine and household remedies. Whereas some of those earliest remedies were subjected to certain refinements, revisions and improvements through practices by trained medicine men. The people were using various recipes traditionally from generation to generation. Some of them might be in recorded form and some of them are not. Today there is an increasing desire to unravel the role of ethnobotanical studies in trapping the centuries old traditional folk knowledge as well as in searching new plant resources of food, drug etc. (Jain, 1987, 1991). People living in the developing countries rely quite effectively on traditional medicine for primary health care (Sullivan and Shealy, 1997; Singh, 2002). Indian traditional medicine is based on different systems such as Ayurveda, Siddha and Unani used by various tribal communities (Gadgil, 1996). The Similipal Biosphere Reserve (SBR) of Orissa, northern India, harbors a rich diversity of ethnobotanical species, which generate considerable benefits from social and economic perspectives. Until now, in the

core and buffer areas people are preparing medicines from their available species of plants which are used to treat common diseases.

Ethnobotanical studies revealed that the tribes of SBR possess a great amount of indigenous knowledge. Tribal lifestyles blend harmoniously with nature, and they are considered as "eco-friendly people". Ethnomedicinal uses of higher plants of Similipal Biosphere Reserve are well studied (Mudgal and Pal, 1980; Pandey and Rout, 2006; Rout and Pandey, 2007; Rout et al., 2007; Rout et al., 2008; Saxena and Dutta, 1975; Saxena et al., 1988; Yogunarasimhan and Dutta, 1972). But cryptogams particularly pteridophytes are often ignored. This group is always at the center stage of attraction to the botanists, horticulturists and nature loving persons since the ancient times. In spite of the luxuriant growth of these plants in and around Similipal forest in Mayurbhanj district, they have not been studied taxonomically or ethnobotanically. The present study has been designed to report the ethnobotanical uses of pteridophytes to treat common diseases on the basis of field surveys and taxonomic identification of plants. The objective of this study is to motivate the agriculturist/farmers to come forward for the utilization, cultivation and preservation of traditional herbs.

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SIMILIPAL BIOSPHERE RESERVE

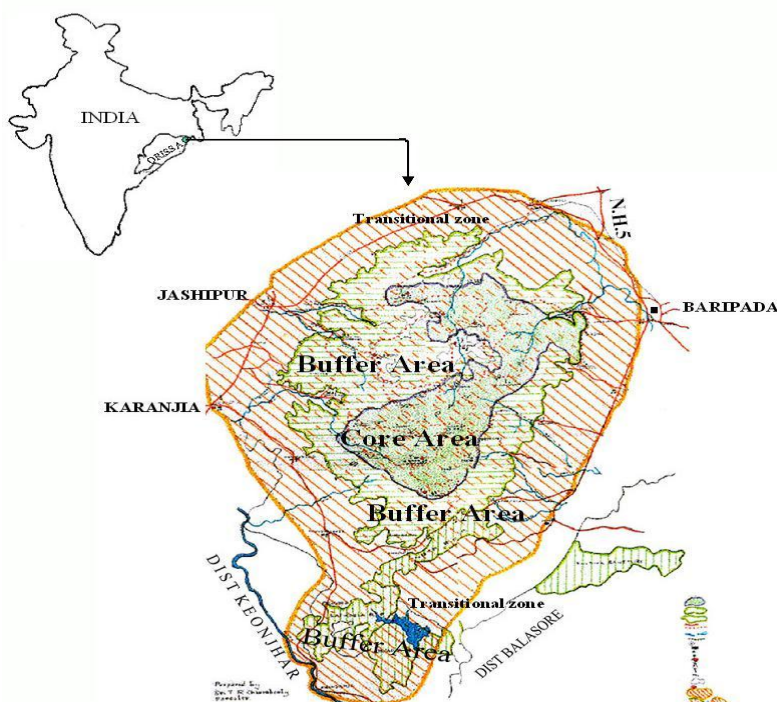


Figure 1. Map of Similipal Biosphere Reserve.

Study area

The similipal biosphere reserve (Figure 1), one of the mega biodiversity zones of the country situated in the central part of the Mayurbhanj district of Orissa ($20^{\circ}17' - 22^{\circ}34'N$ and $85^{\circ}40' - 87^{\circ}10'E$) and covers an area of 5569 km^2 . The landscape of Similipal comprises numerous rolling hills covered with northern tropical semi-evergreen forest, northern tropical moist deciduous forest, dry deciduous hill forest, high level sal forest, grass land and savannah.

There are four villages inside the core area, sixty one villages in the buffer zone and twelve hundred villages in the transitional zone of Similipal Biosphere Reserve with a population of about 4.5 lakhs. In the Mayurbhanj district tribes occupy a big chunk of the population constituting 73% of it; fifty three communities both aboriginal and migrated are found in the district (Naik, 1998). Some of the tribes namely *Kharia*, *Mankdias* and *Saharas* are still in primitive state of living. They depend solely on their surrounding plants for more of their requirements from food to medicines Saxena et al. (1988).

Agriculture is not well developed and therefore most of them depend solely on forests for catering their daily and perpetual need from food to medicine. Since time immemorial the intimate association and dependence of the tribal communities on the local natural resources have enriched them with invaluable knowledge on bio-resource utilization and consequently they have developed exten-

sive knowledge on various plants.

The climate of the Similipal is warm and humid. Three distinct seasons are felt during the year: rainy season (mid June till October), winter (mid October to February) and summer (March to mid June). The annual rainfall is varying from 1200 to 2000 mm. The temperature ranges from 9.8 to $33.5^{\circ}C$. The southern and western aspects are cooler and north eastern aspects are warmer. Periodic earth tremors, thunder storms in the rains and dust storms in late May and early June are further characteristic features of Similipal.

MATERIALS AND METHODS

Ethnobotanical notes of wild plants being used by tribal were taken in trips, observations and collections during 2002-2006. Structured questionnaire survey method was employed to document the traditional ethno medicinal knowledge of local communities in Similipal Biosphere Reserve. Surveys were conducted in different villages of Similipal forest. The village and nesses were selected based on the broad socioeconomic setup and cultural diversity. Collections are valuable because they serve as voucher specimens, records of the plants that are known by community and function as specimens for systematic identification (Martin, 1995). A voucher specimen facilitates the identification of the species encountered during the research and permits colleagues to review the results of the study (Jain and Rao, 1976; Jain, 1987). Knowledgeable persons or medicine men, Kaviraj, experienced and aged persons, local healers of the villages were consulted for recording local name, parts of plants used, methods of drug preparation and recommended doses. Personal interviews and group discussions with local inhabitants

revealed some very valuable and specific information about the plants, which were further authenticated by crosschecking. In addition to crosschecking and recording folk names of plants through collecting voucher specimens, it is important to crosscheck information with different people and compare the results from different methods (Cunningham, 2001). Interviews with people out of the village, pastures or forests were conducted on a systematic basis to know more details about species, their management and distribution. The consulted literatures during field time for identification of species were Beddome (1976), Copeland (1942), Croft (1982), Penny and Metiger (1980), Saxena and Brahmam (1989, 1994-1996), Shanker and Khare (1994) and Vasudeva (1999).

RESULTS

The pteridophytic flora of India comprises about 125 genera with 800-1000 species (Dixit, 1984; Bir, 1992) against the estimated number of about 9800 species of pteridophytes in the World flora (Mebberley, 1997). Dixit (1996) presented a taxonomic account of 141 species of pteridophytes belonging to 66 genera of 41 families in the "Flora of Orissa" and arranged these taxa as per the classification of Pichi-Sermolli (1977). Recently, Panigrahi (1993, 1998) studied the taxonomy and nomenclature of 136 species of pteridophytes that belong to 53 genera under 27 families and enumerated them according to a modern system of classification based on Kramer and Green (1990) and Brummit (1992).

Results obtained from field surveys of the study area are summarized below in alphabetical sequence. The data are presented furnishing the botanical names (alphabetically arranged genus/species wise), family (in parenthesis), and locality followed by details of uses, methods of preparation and mode of administrations of the drugs.

***Adiantum incisum* Forsk. (Adiantaceae); Barheipani**

Fresh or dried up leaves are crushed into paste. 50 g paste is mixed in coconut oil 200 ml. The oil in appropriate amount is applied on hairs twice a day for 2 months to check falling hairs. Infusion of young fronds used as treatment against malaria and bronchial diseases. The leaf powder is mixed with butter and used for controlling internal burning of the body.

***Adiantum philippense* L. (Adiantaceae); Meghasani**

2 g of fresh leaf paste is taken orally on empty stomach twice a day for 10 days for immediate relief from indigestion.

***Adiantum caudatum* L. (Adiantaceae); Kairakacha.**

Fronds extract is effective in wound healing.

***Adiantum lunulatum* Burm. f. (Adiantaceae); Bjanjabasa**

Leaf and root decoction is used for the treatment of chest complaints. Fresh leaf decoction is given to cure irregular

menstrual cycle. Plant paste is given to women to help them to conceive.

***Alsophila glabra* Ssensu Bedd. (Cyatheaceae); Chahala**

Rhizome is used against snakebite.

***Angiopteris evecta* Forst. Hoff. (Angiopteridaceae); Chahala**

50 g of fresh leaf paste mixed with 1 g of common salt and is externally applied for early maturation of boils. The leaf paste mixed with cow ghee that is, (5:1) ratio is locally applied for burns. Leaf extract is used in the treatment of dysentery. Spores are effective in the treatment of leprosy and other skin diseases.

***Asplenium indicum* Sledge, Bull. (Aspleniaceae); Meghasani**

5 g fresh rhizome paste mixed with 10 ml milk is administered thrice a day for 7 days for treatment of gonorrhoea.

***Asplenium laciniatum* D. Don, Prod. (Aspleniaceae); Chahala**

About 10 g of fresh root paste along with 100 ml of cow urine is taken orally in empty stomach once in the morning for fifteen days to have relief from leucorrhoea.

***Blechnum orientale* L. (Blechnaceae), Devasthali**

The leaf juice, 2-3 drops, is put as ear drops in case of severe pain. Rhizome is used to cure the intestinal wounds. Fresh fronds are used as poultice for boils and also used for urinary bladder complaints.

***Ceratopteris thalictroides* (L.) Brongn (Parkeriaceae); Bhanjabasa**

Fresh juice of leaves is applied on fresh wounds immediately for effective stop bleeding. Fronds are used as poultice in skin diseases.

***Cheilanthes tenuifolia* (Blume. f.) Sw. (Cheilanthesaceae); Jenabil**

Rhizome and root extracts are used as a general tonic.

***Christella parasitica* (L.) Lev. (Thelypteridaceae); Jenabil**

5 g fresh root along with 1 g fresh root of *Asparagus racemosus* and 5 g of sugar boiled in 250 ml of water. The decoction orally administered for 10 days to cure spermatorrhea and also used in the treatment of gout and rheumatism.

***Cyathea gigantea* (Wall. ex. Hook.) Holttum. (Hymenophyllaceae); Bhanjabasa**

Fresh rhizome (10 g) mixed 21 black pepper seeds (*Piper nigrum*) are powdered and taken orally with milk twice a

day for one week in empty stomach against white discharges.

***Diplazium esculentum* (Retz.) Sw. (Athryiaceae); Jenabil**

About 20 g of fresh root is boiled in 1 liter of water till to be one fourth of its volume. 3 ml of this decoction along with 2 ml of honey is taken orally in empty stomach twice a day for 15 days to cure spermatorrhea.

***Drynaria quercifolia* (L.) J. Sm. (Drynariaceae); Kandadhenu**

Young shoots are shade dried, powdered and mixed with root powder of *Saraca asoca* 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. The decoction of plant is used in typhoid fever and the fronds are useful in poulticing swellings.

***Dryopteris cochleata* (Ham ex D. Don) C. Chr. (Dryopteridiaceae); Kandadhenu**

Whole plant extract is given orally twice daily in case of snakebite. Powdered rhizome is taken with water twice daily in rheumatism and leprosy.

***Equisetum ramosissimum* Desr. (Equisetaceae); Jenabil**

Whole plant paste is externally applied to cure scabies, itches and allied skin infections. Paste of branches with leaves is used as local application for the treatment of fracture and the dislocation of bones. Younger cones powder with cold water prescribed twice a day for 7 days said to be effective in kidney troubles. Powdered stem dissolved in water is used for enema during stomach disorders in children.

***Gleichenia linearis* L. (Gleichenaceae); Chahala**

Extract of whole plant administered internally to little children suffering from convulsion after which a cold bath is given to reduce high body temperature.

***Hemionitis arifolia* (Burm. f.) Moore. (Hemionitidaceae); Jenabil**

About 10 g of root powder is taken orally with water in empty stomach twice a day for 10 days for treatment of hypertension.

***Lygodium flexuosum* (L.) Sw. (Lygodiaceae); Bhanjapasa**

Infusion of leaves used for treating female infertility. Paste is applied to fix fractured bones. Powdered root 2 g mixed with 1 g *Piper nigrum* and 100 ml of water are orally administered twice a day for 3 days to check blood

dysentery. Rhizome boiled with mustard oil is locally applied to carbuncle and in the treatment of rheumatism, sprains, scabies and ulcers. Aqueous rhizome extract is used for the treatment of gonorrhoea. About one teaspoonful of plant juice is given twice a day to relieve fever.

***Lygodium scandens* Sw. (Lygodiaceae); Upper Barakamda**

Equal proportion of leaves mixed with leaves of *Andrographis paniculata* and rhizome of *Curcuma longa* are made into paste and applied for one week to get relief from joint pain.

***Lygodium microphyllum* (Cav.) R. Br. (Lygodiaceae); Nawana**

Leaf decoction is given in dysentery. Leaf poultices are applied for skin diseases and swelling.

***Marsilea minuta* L. (Marsileaceae); Devasthali**

Plants are used in cough, spastic condition of leg and muscle. About 10 g whole fresh plant paste is mixed with 100 g of curd prepared from black cow's milk. The dosage is given orally once a day in empty stomach for one month against epilepsy. Younger leaves are crushed to extract the juice and 2 drops of juice are dropped in the nostrils of nose twice a day effective in migraine.

***Microsorium punctatum* (L.) Copel. (Polypodiaceae); Patbil**

Leaf and juice are used as purgative, diuretic and for healing wound.

***Ophioglossum reticulatum* L. (Ophioglossaceae); Tarinivilla**

5 g fresh leaf along with 100 g rice is made into a cake and the boiled cake is taken orally in empty stomach for 15-20 days against menstrual disorders. Fresh leaves and tubers are crushed to form the paste. The paste is applied on boils twice a day for 5 days said to be effective treatment. The paste of the plant is applied on burns as cooling agent.

***Pteridium aquilinum* Kuhn (Polypodiaceae); Barheipani**

Decoction of rhizome and fronds is taken orally at bedtime in the treatment of worms. The infusion of plant is used to relieve stomach cramps and increases urine flow. Decoction of rhizome drunk as herbal health tea.

***Pteris biaurita* L. (Polypodiaceae); Chahala** Juice of

frond is applied on cuts and bruises. ***Pteris cretica* L.**

(Polypodiaceae); Kandadhenu Fronds are antibacterial

and made into a paste that is

applied on wounds.

***Pteris pellucida* Presl, Rel. (Polypodiaceae), Jenabil**

50 g fresh leaf paste mixed with 5 ml of cow ghee is administered thrice a day for 7 days for early maturation of boils.

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

10 ml of fresh leaf juice is taken with 200 ml toddy (sap) obtained from *Phoenix sylvestris* in the early morning on empty stomach and at noon for 2-3 days for irregular menstrual cycle

***Pteris vittata* L. (Polypodiaceae); Barehipani**

Fresh rhizomes and leaves taken in equal quantity, grounded to make a fine paste and applied twice on glandular swellings for 15 days.

***Selaginella repanda* (Desv. ex Poir.) Spring (Selaginellaceae); Barheipani**

About 10 g of the root powder is mixed with boiled water and made a paste. The paste is applied externally on the white patches in case of leprosy. Care should be taken to remove the paste after 5-7 min; otherwise there is a chance of irritation.

***Sphenomeris chinensis* (L.) Maxon. (Lindsaeaceae); Meghasani**

Tender leaves are chewed for at least 5-10 min for treatment of toothache.

***Tectaria cicutaria* (L.) Copel. Philipp. (Dryopteridaceae); Bhanjabasa**

Tender leaves are mixed with fresh leaves of *Azadirachta indica* in equal proportion (5:5) by adding little mustard oil and is thoroughly grounded and applied 2- 3 times per day for 15 days against eczema and scabies.

DISCUSSION

Documenting the indigenous knowledge through ethnobotanical studies is important for the conservation and utilization of biological resources. Information on uses of 33 fern species of 21 families for different diseases collected from the Similipal Biosphere Reserve, are presented in this paper. This information was checked with available literature (Karuppusamy et al., 2001; Girach and Aminuddin, 1989; Mishra et al., 2001; Singh et al., 1989). Most of the ethno-medicinal information provided in this study has not been reported earlier. Although these herbal remedies and their efficacy is claimed to be high;

detail clinical study is needed for better utilization of ethno-bio-resources. The ethnomedicinal information serves as a base for new compounds with active principles for phytochemical, pharmacognostical, pharmacological and clinical research. Indigenous people use many of the pteridophytic medicinal plants traditionally for treating their common ailments like gastro-intestinal problems, including stomach ache, peptic ulcers, diarrhea and dysentery, skin problems including wounds, abscess, eczema and scabies, chest complains, snake bite, urinary complaints, fracture of bones, hypertension, glandular swellings and used as a tonic. In each village and community, there are experts who practice such treatments and thus an effective local health tradition exists. The data collected show that majority of the remedies are taken orally. People use these plants in different forms such as juice, extract, decoction, paste, infusion, powder etc. Most of the reported preparations are drawn from a mixture of plant; single plants are used rarely. In other parts of the country, the use of mixtures of plant species in treating a particular ailment is fairly common. Generally, the people of the study area still have a strong belief in the efficacy and success of herbal medicine. Researchers have stressed the need of conservation of the various pteridophytes (Bir, 1988). At present, a number of taxa in ferns and fern allies species have been eradicated or lost due to deforestation and Akhand shikar (by setting fire to the forest) in Similipal Biosphere Reserve. But in reality the jungle pirates are very active round the year in looting the forest and poaching, which cause irreparable damage to the biosphere. Instead of exploiting the ferns and fern allies for their economic value and ornamental beauty, care should be taken for their conservation (Benjamin and Manickam, 2007). In view of this, it is suggested that rare species of fern and fern allies should be protected from merciless collection and destruction in Similipal forest. Special attention should be taken for the cultivation and propagation of the pteridophytes, so that the present and future generation will enjoy the economic value of this unique group of plants (May, 1978).

It is concluded that Similipal is rich in wild pteridophytes and the tribal communities in remote areas are still dependent on indigenous knowledge for health care. The existing deforestation and habitat fragmentation would pose a serious threat to the growth of wild plants. The declination of traditional ethnobotanical knowledge with over exploitation and habitat destruction amounts to threatening the survival of wild plants. Henceforth, documentation of traditional knowledge needs to be given top priority to help conservation resources and preservation of the disappearing knowledge. Ethnobotanical knowledge if recognized, valued and implemented properly can help the environment and society in a holistic way.

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