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STUDIES ON PTERIDOPHYTIC FLORA WITH SPECIAL REFERENCE TO THEIR ETHNOMEDICINAL USES IN ANGUL DISTRICT OF ODISHA, INDIA

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Abstract

This paper deals with the floristic exploration and ethnomedicinal uses of common pteridophytes by the tribal communities of the Angul district of Odisha, India, for the treatment of various diseases. Aside from the higher angiospermic plants, the tribal and atribals of the district are found to utilize some pteridophytic plants for their primary healthcare management. The findings of the present work could document the ethnotherapeutic claims for 25 pteridophytic plants collected from the study area along with their taxonomic details and parts used in medicine besides the mode of use.

Key words: Pteridophytes, Ethnomedicine, Angul district (Odisha)

Introduction

Pteridophytes not only constitute the dominant component of flora of a particular geographical territory but also contribute to the biological diversity of that region. The study of pteridophytes is extremely fascinating from their morphological point of view as well as of great taxonomic interest. Occupying a distinct position between non seed bearing and seed bearing plants, pteridophytes were the dominant plant group on this planet about 250 million years ago. People living in the developing countries rely quite effectively on traditional medicine for primary health care (Sullivan and Shealy, 1997). Indian traditional medicine is based on different systems such as 'Ayurveda', 'Siddha' and 'Unani' used by various rural communities (Gadgil, 1996). The Angul district of Odisha, India, harbours a rich diversity of ethnobotanical species, which generate considerable benefits from social and economic perspectives. The tribes of Angul district possess a great amount of indigenous knowledge on use of plants as medicines. Although ethnomedicinal studies of higher plants of the state of Odisha have been reported by several workers (Mudgal and Pal, 1980; Mahalik *et al*., 2015; Rout and Pandey, 2007; Rout *et al.*, 2007; Rout *et al*., 2008; Saxena and Dutta, 1975; Saxena *et al*., 1988; Satapathy, 2008, 2010; Satapathy and Brahmam, 1996, 1999; Satapathy and Chand, 2003, 2010; Satapathy and Panda, 1992; Satapathy *et al*., 2012), survey and documentation of cryptogams particularly pteridophytes are often ignored. This group of plant resources is always at the centre of attraction to the botanists, horticulturists and naturalists since ancient times. In spite of the luxuriant growth of these plants in and around Angul district, they have not been studied with respect to their taxonomy and etnomedicinal claims. The present investigation was intended to study the floristic composition and uses of pteridophytes to treat normal ailments based on field studies and interactions with the tribes and local inhabitants. The main objective of this study was to motivate the native populace and to generate in them awareness for the scientific utilization, cultivation and preservation of these pteridophytes. Especially, the attempt was made to collect the information on the medicinal value of ferns and fern allies traditionally used by the inhabitants of Angul district and their conservation.

Study area

Angul region is situated in the focal point of the territory of Odisha and lies between 20° 31-21° 40 N latitude and 84° 15-85° 23 E longitude (Fig. 1). The altitude is between 564 and 1187 metres. The district has an area of 6232 km^2. It is surrounded by Dhenkanal and Cuttack districts in the east. Deogarh, Keonjhar districts and Sundargarh districts in the north, Sambalpur and Sonepur districts in the west and Boudh and Nayagarh districts in the south side. The forest area involves the reserve forests, demarcated protected forests, undemarcated protected forests and forests under revenue records. Total

Table 1: Important ethnomedicinal pteridophytes of Angul district.

Sl. No.	Botanical Name	Family	Local Name	Parts Used	Mode of Use
1.	*Adiantum capillus -veneris* L.	Adiantaceae	Hansraj, Hanspadi	Leaf	Leaf juice is used against cough and cold; leaf chewed for the treatment of mouth blisters. Frond extract mixed with honey is applied as eye ointment against conjunctivitis.
2.	*Adiantum incisum* Forsk.	Adiantaceae	Chira Shailachhanda	Leaf	The leaf powder is mixed with butter and given once in a day for seven day to treat internal burning of the body. Juice of leaves is used in skin diseases.
3.	*Adiantum philippense* L.	Adiantaceae	Shailachhanda	Leaf, Rhizome	Rhizome powder is taken to reduce glandular swellings. Leaf juice is given in dysentery, ulcers and burning sensation.
4.	*Adiantum lunulatum* Burm.	Adiantaceae	Bichishai-lachanda	Leaf	Leaf and root decoction (10 ml) is given for the treatment of chest complaints due to severe bronchitis.
5.	*Ampelopteris prolifera* (Retz.) Copel.	Thelypte-ridaceae	Latapakhi	Leaf,	Leaves (5g) and rhizoids (2g) collected, washed thoroughly, grinded to make paste and given along with warm milk for a month against general debility.
6.	*Asplenium nidus* L.	Aspleniaceae		Leaf, Root	Rootstock is good for fever and elephantiasis. Leaf powder is smoked to cure cold and cough.
7.	*Blechnum orientale* L.	Blechnaceae	Mrugapakhi	Leaf	Leaf juice is applied on the affected part to treat boils and carbuncles.
8.	*Cheilanthes tenuifolia* (Burm.f.) Sw.	Pteridaceae	Simarenu	Leaf, Rhizome, Root	Fronds cut into pieces, made to a paste and applied on abscess in the form of poultice to expel pus and also used as antiseptic. The aqueous extract (10 ml) of rhizome and roots are given two times a day for one month as general tonic to restore health in children.
9.	*Cyathea spinulosa* Wall. ex Hook.	Cyatheaceae	Kantakunji	Root	Soft pith and roots are used in the preparation of a drink which is given to the lady patient suffering from anemia or iron deficiency.
10.	*Dicranopteris linearis* (Burm.f.) Underw.	Gleichinaceae	Dishira	Leaf,	Young rachises are eaten as vegetable after boiling. Decoction of plant is given to children as laxative. The fronds of young plant are boiled with cow milk and given for one month against sterility in women. Freshly extracted leaf juice is slightly heated and taken internally against throat infection.
11.	*Diplazium esculentum* (Retz.) Sw.	Athyriaceae	Dwirenu	Leaf	Young fronds are used as green vegetables. Circinately coiled young and fresh frond is boiled with salt and taken internally to restore broken health of the mother of a new born baby.
12.	*Dryopteris cochleata* (Buch.-Ham. ex D. Don) C. Christensen	Dryopte-ridaceae	Kuthapakhya	Leaf, Rhizome	The young leaves are used as vegetable; leaf paste is used against eczema. Plant paste is applied on wound caused by insect bite to prevent infection. A small portion of powdered rhizome (2g) is taken with water twice daily in rheumatic fever; also used against amoebic dysentery.
13.	*Equisetum ramosissimum* subsp. Debile (Roxb. ex Vaucher)Hauke	Equise-taceae	Hayashanku	Leaf, Rhizome	Rhizome is used to reduce glandular swellings. Powdered plant dissolved in water is used during stomach disorder in children. Barren women are given to drink rhizome decoction to facilitate fertilization. Paste of branches with leaves is used as local application for the treatment of fracture and the dislocation of bones.

Table 1 continue ....

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Sl. No.	Botanical Name	Family	Local Name	Parts Used	Mode of Use
14.	*Lygodium flexuosum* (L.) Sw.	Lycopodiaceae	Mahajala	Rhizome, Root	Rhizome powder is used in skin diseases. Fresh roots boiled with mustard oil is applied externally on the affected parts of the body against carbuncles and rheumatic pain. Rachis of the plant is tied over forehead to reduce headache. Rhizome paste is applied against piles and herpes infection. The plant juice is given against jaundice and high fever.
15.	*Marsilea minuta* L.	Marsileaceae	Sunsunia	Leaf	Leaves are cooked and eaten as vegetable by the local people. The decoction of leaves along with ginger is given to cure cough and bronchitis. Leaf paste is used in skin diseases including eczema and scabies.
16.	*Nephrolepis cordifolia* (L.) C. Presl.	Nephrolepidaceae	Brukati	Leaf, Tuber	Paste of the leaves is applied on wound to check bleeding. Fresh watery tubers are eaten to especially quench thirst. Decoction of tubers is given to cure cough and intestinal disorders. Fresh watery tubers are used against stomach ulcer and acidity.
17.	*Ophioglossum gramineum* Willd.	Ophioglossaceae	Aahijihwa	Leaf, Rhizome	Mucilaginous exudates of the plant is given against angina. The fronds are considered toxic and are used to treat wounds and warts. Tribal communities of the area uses rhizome decoction as a lotion against boils and rashes.
18.	*Ophioglossum reticulatum* L.	Ophioglossaceae	Ahijihwa	Leaf	The paste of plant is applied on fresh burns as cooling agent. The extract of leaf is given as health tonic to the children after recovery from tuberculosis.
19.	*Psilotum nudum* (L.) P.Beauv.	Psilotaceae	Krushatanu	Leaf	Leaf juice is used against diarrhoea and bacillary dysentery.
20.	*Pteris biaurita* L.	Pteridaceae	Dwiangu	Leaf, Rhizome	A decoction of the rhizome and fronds is given against bleeding piles.
21.	*Pteris vittata* L.	Pteridaceae	Mrudhikangu	Leaf, Whole plant	Leaves used are offered to divine deities at the time of illness for speedy recovery. Plant extracts is given to the patients suffering from viral fever.
22.	*Selaginella bryopteris* (L.) Baker	Selaginellaceae	Kali Sanjibani	Leaf, Whole plant	Plant is used as diuretic. The dried leaves along with tobacco is smoked by tribal people for inducing hallucinations. The plant decoction mixed with old jaggery is given against menstrual disorders.
23.	*Selaginella repanda* (Desv. ex Poir.) Spring	Selaginellaceae	Umi Sanjibani	Leaf	Fronds are used as antibacterial agent. Leaf juice (10ml) along with honey (5ml) is given in the treatment of inflammations and muscular pain.
24.	*Sphenomeris chinensis* (L.) Maxon.	Lindsaeaceae	Sikkhipuchhika	Leaf	Paste of the plant is given in swelling and sprains. Dried fronds are used as a substitute for tea leaves. The decoction of leaves also used internally for chronic enteritis.
25.	*Thelypteris palustris* Schott.	Thelypteridaceae	Jayapakhhii	Whole plant	Plant paste is applied externally to treat wounds and fresh cuts.

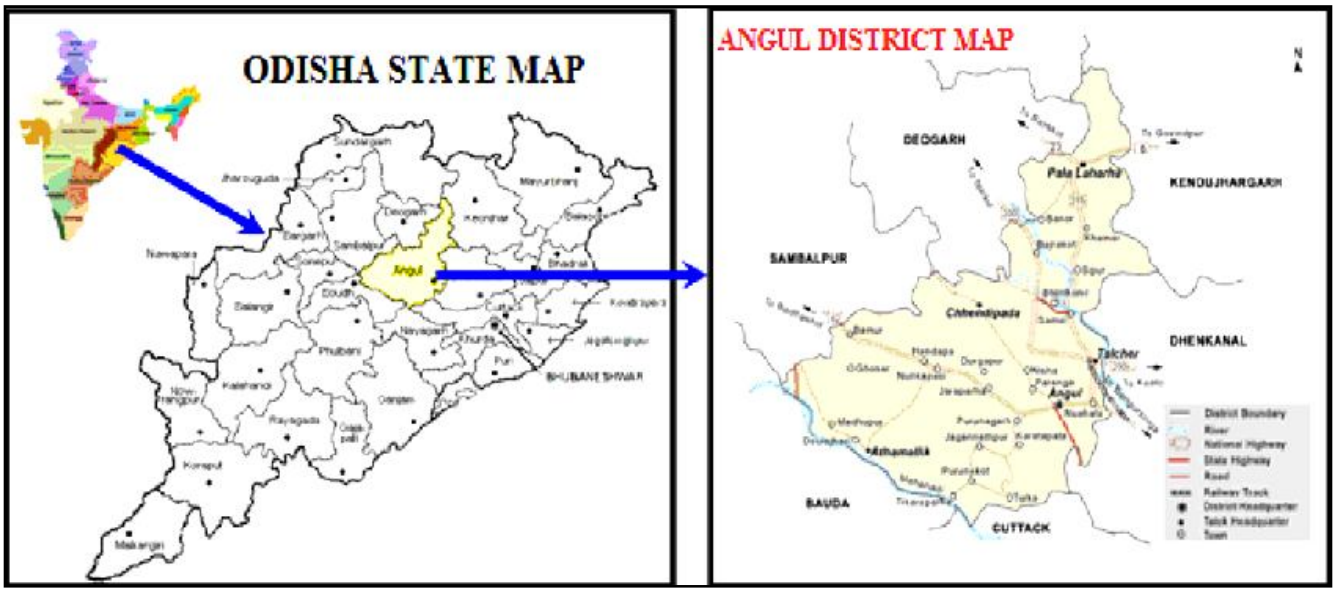

Fig. 1: Map of Angul district of Odisha.

forest area constitutes 37% of the geographical area of the district. The inhabitant mostly belongs to Santal tribes.

Materials and Methods

The present study is the outcome of the two years of exhaustive field survey in the different parts of Angul district during 2016-2018. Ethnomedicinal information was gathered by interacting with the local and tribal people using standard questionnaire. All the voucher specimens collected during the field survey were deposited in the Herbarium of Post Graduate Department of Botany, Utkal University, Vani Vihar, Bhubaneswar. Identification of the plant specimens were done with reference to "The Flora of Orissa" (Saxena and Brahmam, 1994-1996) and in consultation with standard literature.

Results

During the present investigation a total number of 25 medicinal pteridophytes were recorded belonging to 17 families and 19 genera. Among the families Adiantaceae and Pteridaceae were found dominant representing 4 and 3 medicinally important species respectively. *Adiantum* was the most dominant genus followed by *Thelypteris, Pteris, Ophioglossum* and *Selaginella*. Among the medicinal pteridophytes, *Dicranopteris linearis, Diplazium esculentum, Dryopteris cochleata, Equisetum ramosissimum, Lygodium flexuosum, Marsilea minuta* and *Selaginella bryopteris* were rated as high value species being exploited for several medicinal purposes. It was observed during the investigation that tribal people as well as the local inhabitants use plant parts such as root, rhizome and leaves to cure different common ailments like diarrhoea, dysentery, colic pain, constipation, indigestion, gastric disorders, rheumatism, chest complaints, cough, cold, bronchitis, asthma, fever, skin diseases and bone fracture etc. Table 1.

Discussion

Extensive floristic survey and observation of the study area revealed that the district of Angul is an excellent repository of pteridophytic flora besides representing a rich phytodiversity. It was noted that the tribal community not only depend on the plant resources for their livelihood but also use them for their primary health care system. Tribes of the district use numerous plants and their merchandise to combat various human diseases. The inhabitants of the study area were found to use around 25 common pteridophytes in their routine health care system to treat the several diseases encountered by them. It is recommended that these medicinal pteridophytes used by the tribal communities need to be conserved and judiciously exploited in order that these natural therapeutic resources are not exhausted and dwindle forever.

Conclusion

The present study indicated that Angul district harbours a rich diversity of ethnomedicinal pteridophytic plants. Nevertheless, it is a matter of concern that the developmental activities, such as deforestation, habitat destruction, urbanization and mining activities may cause a serious threat to the existence of these valuable pteridophytic species. Therefore, it is imperative to conserve the phytodiversity as well as documentation of the wealth of information hitherto confined among the local tribes before these are permanently lost.

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References

Beddome, R.H. (1976). Handbook to the ferns of British, India, Ceylon and the Malaya Peninsula with supplement, Today and Tomorrow's Printers Publishers, New Delhi.

Benjamin and V.S. Manickkam (2007). Medicinal pteridophytes from Western Ghats. *Ind. J. Trad. Know.,* **6(4):** 611-618.

Dixit, R.D. (1984). A census of the Indian Pteridophytes, Flora of India. Ser.4 *Bot. Surv. Ind.* Howrah, Calcutta, India, 177pp.

Gadgil, M. (1996). Documenting diversity: An experiment. *Curr. Sci.,* **70(1):** 36.

Mahalik, G., S. Sahoo and K.B. Satapathy (2015). Ethnobotanical survey of plants used in the treatment of urinary disorders in Dhenkanal district of Odisha, India. *IOSR-J. Env. Sci. Tox. & Food Techn*., **9(8):** 58-63.

Malay Bharti (2011). Ethno medicinal importance of some common pteridophytes used by tribals of Ranchi and Latehar district of Jharkhand, India, *The Socios.,* **3(1-2):** 5-8.

Mishra, R.C., P.C. Panda and P.A. Das (2001). Taxonomic study of the ferns and ferns allies of Gandhamardan hills, Orissa. *J. Econ. Tax. Bot.,* **25(3):** 577- 579.

Mudgal, V. and D.C. Pal (1980). Medicinal plants used by tribals of Mayurbhanj, Odisha. *Bull. Bot. Surv. Ind*., **22(1-4):** 59-62.

Rout, S.D., T. Panda and N. Mishra (2009). Ethnomedicinal studies on some pteridophytes of Similipal Biosphere Reserve, Orissa, India, *Int. J.Med. and Medic. Sci.,* **1(5):** 192-197.

Rout, S.D., T. Panda and N. Mishra (2009). Ethno medicinal plants used to cure different diseases by tribals of Mayurbhanj district of North Orissa. *Stud. on Ethnomed.,* **3:** 27-32.

Rout, S.D. and A.K. Pandey (2007). Ethnomedicobiology of Similipal Biosphere Reserve, Orissa. In: A.P. Das and A.K. Pandey, eds. *Advan. Ethnobot. Deheradun*, 247-252.

Satapathy, K.B. and P.K. Chand (2003). Plants used in healthcare of tribal women and children of Sundargarh district of Orissa. *Plant Sc. Res.,* **25(1-2):** 52-57.

Satapathy, K.B. (2008). Interesting ethnobotanical uses from Juang, Kolha and Munda tribes of Keonjhar district, Orissa. *Ethnobotany*, **20(l-2):** 99-105.

Satapathy, K.B. (2010). Ethno-veterinary practices in Jajpur district of Orissa. *Ind. J. Trad. Knowl.,* **9(2):** 338-343.

Satapathy, K.B. and M. Brahmam (1996). Some medicinal plants used by tribals of Sundargarh district, Orissa, India. In: S.K. Jain (ed.), Ethnobotany in human welfare. *Deep publication*, New Delhi, 232-244.

Satapathy, K.B. and M. Brahmam (1999). Some interesting phytotherapeutic claims of tribals of Jajpur district (Orissa.), *India. J. Econ. Tax. Bot*., **23(2):** 467-472.

Satapathy, K.B. and P.K. Chand (2010). Insectivorous sundew (*Drosera burmanii* Vahl) - A dwindling ethno-medicinal plant species from Sukinda chrome zone and Barbil mining area of Odisha. *Biohelica*, **1(2):** 10-15.

Satapathy, K.B. and P.C. Panda (1992). Medicinal uses of some plants among the tribals of Sundargarh district, Orissa. *J. Econ. Tax. Bot. (Addl. Ser),* **10:** 241-249.

Satapathy, K.B., B.B. Sahu and G.S. Jena (2012). Crop Weeds diversity and their ethnomedicinal uses in the treatment of common ailments in Jajpur district of Odisha, (India). *Int. J. Med. Arom. Plants,* **2(1):** 80-89.

Saxena, H.O., M. Brahmam and P.K. Dutta (1988). Ethnobotanical studies in Similipal Forests of Mayurbhanj District (Orissa) *Bull. Bot. Surv. Ind.*, **30:** 83- 89.

Saxena, H.O. and M. Brahmam (1989). The flora of Similipahar (Similipal), Orissa, Regional Research Laboratory (CSIR); Bhubaneswar.

Saxena, H.O. and M. Brahmam (1994-96). The flora of Orissa, vol. I-IV. Regional Research laboratory (CSIR), Bhubaneswar and Orissa forest Development Corporation Ltd. Bhubaneswar.

Saxena, H.O. and M. Brahmam (1996). Pteridophyta. In: eds. Flora of Orissa. *Orissa Forest Development Corporation and RR Lab Bhubaneswar,* **3:** 2536-2654.

Saxena, H.O. and P.K. Dutta (1975). Studies on the ethnobotany of Orissa. *Bull. Bot. Surv. Ind.,* **17:** 124-131.

Sullivan, K. and C.N. Shealy (1997). Complete natural Home remedies. Element Books Ltd., Shaftsbury, U.K.