UTILIZATION OF PTERIDOPHYTES OF ACHANAKMAR-AMARKANTAK BIOSPHERE RESERVE, CENTRAL INDIA IN WOMEN’S HEALTH AND BEAUTY CARE PRACTICES

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Research Article

ABSTRACT

This study describes and documents the information on traditional utilization of 17 species of pteridophytes belonging to 11 families and 13 genera (ferns and fern allies) in the treatment of women’s health and beauty care practices by the tribal people of Achanakmar-Amarkantak Biosphere Reserve, Central India.

INTRODUCTION

The pteridophytes are the second largest component of the world flora. They are one of the oldest and primitive vascular plant groups on earth. They grow luxuriantly in moist tropical and temperate forest and their occurrence in different eco-geographically threatened regions from sea level to the highest mountain are of much interest. They prefer shady and moist habitats with moderate temperature, but also occur throughout an extraordinary range of habitats including high altitude. About 12,000 species of pteridophytes occur in the world flora of which about more than 12,000 species likely to be reported from India[1,2].

In comparison to higher plants they have found very little applications in medicine and are still neglected. The numbers of contributions about the taxonomy, ecology and distribution of pteridophytes have been published time to time in various ways but enough attention has not been paid towards their useful aspects. The ethnobotany and medicinal values of Indian pteridophytes have been described by various workers time to time. Likewise they can be used for food, fiber, crafts, building material, abrasives, and decoration, and also as medicine[3,4,5]. They have been effectively used in the different systems of medicines like Ayurvedic, Unani, Homeopathic and other systems of medicines. Kirtikar et al., have described 27 species, Chopra et al., have included 44 species, Nadkarni recorded 11 species and Nayar recorded 29 species of medicinal ferns and their allies from India[6,7,8,9].

In a recent compilation, Singh reported 160 species of useful pteridophytes in India on the basis of phytochemical, pharmacological and ethnobotanical studies[10]. An overview on medicinal uses of 110 Indian pteridophytic has been published[11]. The antimicrobial and antibiotic potential of some ferns has been studied[12,13,14]. Caius and Gaur & Bhatt contributed to the traditional knowledge of ethnobotanical and medicinal uses of pteridophytes of India[15,16].

The ethnobotanical studies in Amarkantak and adjoining area have not been very confined on pteridophytes and very few efforts have been made so far to explore their ethnobotanical and traditional knowledge[17]. During past years extensive survey in connection with systematics and ethnobotany of pteridophytic biodiversity, in different parts of Central India has been explored by various researchers[18-24]. A total 134 ferns and fern allies have been reported from Central India, out of which 35 species are from Achanakmar-Amarkantak Biosphere Reserve[25]. Ethnomedicinal properties of 8 species of pteridophytes from Amarkantak has been described[26,27] and preliminary antimicrobial potential of 5 ethnomedical pteridophytes have been studied[28].

The study area, Achanakmar-Amarkantak Biosphere Reserve (Fig.1.i, ii) is the eastern most extremity of Maikal range and well-known hot spot of medicinal plant biodiversity in Central India. It came into existence in March 30, 2005 and is located between 22° 15’-22° 58’ N latitudes and 81° 25’-82° 5’ E longitudes. The total area of the Biosphere Reserve is 3,835.51 sq. km. It covers parts of Anuppur and Dindori districts of Madhya Pradesh and parts of Bilaspur district of Chhattisgarh State. Out of the total area, an area of 1,224.98 sq. km falls in Madhya Pradesh and the remaining area of 2,610.53 sq. km falls in Chhattisgarh state. The entire area of 551.55 sq. km of Achanakmar Sanctuary falling in Chhattisgarh State will form the core zone and remaining area of 3, 283.96 sq. km surrounding the core zone will form the buffer zone. (Fig.1.iii). Most of the land is undulating and covered with thick subtropical hill forest. It has an average elevation of 1048 meters (3438 ft). Maximum rainfall is during July to September, with annual rainfall of over 1900 mm. Several streams and Nallas are flowing through the reserve and many of them are perennial.
Traditionally, the tribal people mostly prefer plant medicines. The natural vegetation in the Achanakmar-Amarkantak Biosphere Reserve can classify into Northern Tropical Moist Deciduous and Sothern Dry Mixed Deciduous forests\(^9\) (Fig. 2 xii). The region provides shelter to various flora species that belong to the lower and higher groups. It is interesting to note that in the area, proportion of genera is relatively richer than the species. In comparison to Angiosperm plant diversity, the pteridophytes are not rich in the area. The region is tribal dominant and main tribes are Gond, Bhatra, Kanwa, Pradhan, Panka, Korku, Mariya, Kaul, Bhil, and Baigas. They are partially or completely dependent on forest products for their survival. These people have assimilated unique knowledge about the surrounding plant wealth. This indigenous knowledge is a potential tool in searching for new economic plants for food and medicines. In turn they protect the forests, conserve its diversity, and also enrich fertility with various cultural activities. They also have a special skill that has been passed down every generation.

Traditionally, the tribal people mostly prefer plant medicines rather than modern medicines for their health problems. The tribal women are generally facing health problems due to unhygienic living conditions, malnutrition and hard physical work, often even during pregnancy. Many of the plant species including pteridophytes used by traditional healers and ethnic women in gynecological disorders like abortifacients, excessive-bleeding (hypermenorrhoea), painful menstruation (dysmenorrhoea), irregular menstruation, amenorrhoea, leucorrhoea, abortion, sterility in women and prolapsed uterus. They are capable of producing good results in women’s health and well-being as some species like Adiantum, Selaginella, Cheilanthes etc. have nutritional and medicinal values. Singh & Singh reported ethnomedicinal use of 23 species of pteridophytes in reproductive health of tribal women of Madhya Pradesh\(^9\).

Keeping the aforesaid facts in view, the present study was undertaken with the aim of enlisting the ethnomedicinally important species of Pteridophytes used in women’s health and beauty care by the tribal communities of Achanakmar-Amarkantak Biosphere Reserve in Central India. The study also motivates the farmers for the sustainable use, cultivation of selected species which are subjected to over harvesting and preservation of traditional knowledge and conservation of these pteridophytes.

MATERIALS AND METHODS

Intensive survey cum collection practices was made in the rural and tribal pockets of Achanakmar-Amarkantak Biosphere Reserve. For the study of all kinds of vegetation field tours were conducted to different areas like Jamunadhara, Jaleshwar, Amanala, Durgadharma, Samundhara, Kapildhara Barati, Narmada kund, Doodhdhara, Bhagdhnala, Sonmunda, Mai ki bagia, Kabir chabutara, Jagatpur, Karanjia, Gorila, Keonchhi, Antaria, Lammi, Chaparwa, Achanakmar, Divdharma, Pandwani Talab, Lorni and Lakshmandongri in Achanakmar-Amarkantak Biosphere Reserve during various seasons. The information on ethnomedicinal pteridophytes used by tribal women in health and beauty care practices was mainly gathered from the village chiefs, traditional healers/Vadhya and local old women of various ethnic groups who have the knowledge of the utilization of plants as herbal medicine using semi-structured questionnaires (Fig. 2 xi). The pteridophytes were collected in its fertile stage from its natural habitat. During the survey it was observed that seventeen species of pteridophytes are wildly used and sold by local tribal communities for Women’s health and beauty care problems in the local market (Fig. 2x). These pteridophytes grow naturally in rock crevice and boulders near water stream in shady and moist places.

The data presented are based on the first hand information collected during the period in months of October and November, 2012. The herbarium specimens have been deposited in Guru Gobind Singh Indraprastha University, Dwarka, New Delhi.

Enumerations

**Pteridophytes used by Tribal Women’s health care practices**

*Actiniopteris radiata* (Sw.) Link (Pteridaceae: Mayurshikha)

**USES:** Fresh paste/dried powder of leaves used to treat leucorrhoea, to improve fertility and used as aphrodisiac substance\(^31,30\). Leaves paste/ash used for conception\(^14,30\). Occasional. (Fig.1 i).

*Adiantum philippense* L. (Pteridaceae: Kalijhant)

**USES:** Dried rhizome powder used orally as contraceptive. Juice of fresh fronds used to restart the stop menses\(^27,30\). Dried powder of whole plant used as shampoo to clean hairs. It is a good hair tonic to stop hair loss/hair graying and remove dandruff.

*Blechnum orientale* L. (Blechnaceae: Hastajori, Shield Fern)

**USES:** Complete sterility is claimed by tribal women who eat the top new leaf of this fern each day for 3 days, then wait 2 weeks before repeating the treatment. Paste of fresh leaves used to make facial mask to remove spots\(^22,33,30\). Occasional. (Fig.2 ii).

*Cheilanthes albomarginata* C.B. Clarke (Pteridaceae: Glade fern)

**USES:** Dried fronds powder along with pulverized ginger rhizome (*Zingiber officinale*) L. used orally for treatment of infertility in women\(^24,30\). Occasional.

*Cheilanthes farinosa* (Forsk.) Kaulf. (Pteridaceae: Chandi booti, Nanha, Silver fern)

**USES:** Decoctio fronds used orally to treat irregular menstruation\(^35,30\). (Fig. 2 iii). Common.

*Diplazium esculentum* (Retz.) Sw. (Woodsiaceae: Vegetable fern)
USES: Fresh young leaves eaten by pregnant women as protection against difficult childbirth 35,30. (Fig. 2 iv). Common.

**Dryopteris cochleata** (D. Don) C. Chr.  
(Dryopteridaceae: Kakoliisag, Jatashankari)  
USES: Whole plant extract is used as cooling medicine for gonorrhea 21,30. Common.

**Equisetum ramosissimum** Desf. ssp. debile (Roxb. ex Vauch) Hauch  
(Equisetaceae: Had-jod)  
USES: Decoction of rhizome used orally in gonorrhea. The same dose is taken orally to facilitate fertilization in women 21,22,30. (Fig. 2 v). Common.

**Lygodium flexuosum** (L.) Sw.  
(Schizaeaceae: Kalijar, Climbing fern)  
USES: An infusion of leaves used in menorrhagia and treating female infertility. Aqueous rhizome extract used orally to treat gonorrhea and dysmenorrhea 21,22,27,30. Common. (Fig. 2 vi).

**Marsilea minuta** L.  
(Salviniaeae: Caupatiya, Sunsuniya, European Water Clove)  
USES: Whole plant extract used as aphrodisiac for women and men both 34. Occasional.

**Nephrolepis cordifolia** (L.) C. Presl  
(Davalliacaeae: Nechii, Ladder fern)  
USES: Rhizome extract is used to cause permanent sterility in women 36,20,22,27,30. Common.

**Nephrolepis exaltata** (L.) Schott  
(Davalliacaeae: Fish bone fern)  
USES: Rhizome extract used against women sterility. It is also used in treatment of menstrual disorders and Birth-aid in parturition 38,30. Occasional. (Fig. 2 vii).

**Ophioglossum reticulatum** L.  
(Ophioglossaceae: Van palak, Brahmi fern)  
USES: Fresh leaves along with rice taken orally in empty stomach for against menstrual disorders. Decoction of whole plant is taken orally in urine hemorrhage and leucorrhoea 39,40. The tribal women used this sag after childbirth to prevent the body from infection. It also gives strength to the women 39,41,30. Common. (Fig. 2 viii).

**Pleopeltis macrocarpa** (Bory ex Willd.) Kaufl.  
(Polypodiaceae)  
USES: Decoction of entire plant taken orally causing abortion (abortifacient) 42,30. Rare.

**Selaginella bryopteris** (L.) Bak.  
(Selaginellaceae: Sanjeevani)  
USES: Fresh leave paste is given in gonorrhea and other venereal diseases (spermatorrhoea and leucorrhoea) 22,27,30. Common. (Fig. 2 ix).

**Selaginella ciliaris** (Retz.) Spring  
(Selaginellaceae: Chhoti sanjeevan)  
USES: Decoction of fresh whole plant or paste used orally against amenorrhea 22,30. (Common)

**Selaginella repanda** (Desv. ex Poir.) Spring  
(Selaginellaceae)  
USES: Paste of fresh leaves is taken orally against amenorrhea 10,22,30. Common.

**RESULTS**  
The present study revealed that 17 species of pteridophytes are traditionally used by tribal women of Gond, Bharia, Kanwa, Pradhan, Panka, Korku, Mariya, Kaul, Bhil, and Baigas of Achanakmar-Amarkantak Biosphere Reserve in their health and beauty care practices which contribute to about 48% of total pteridophytic diversity (35 species) of the area.

**DISCUSSION**  
People use several methods to prepare medicines from pteridophytes traditionally. They use different parts of the plant in dried and fresh form both. The plant materials are used singly as well as sometimes in combination with milk, honey, curd, water or other plant parts. All plant parts such as rhizomes, fronds, leaves, spores, tubers and whole plant are used as medicine. Among the different plant parts documented and utilized, highest proportion (46%) was of leaves, followed by rhizome (29%), fronds (8%) and whole plant (17%) as showed in the graph (Fig. 3i). Since among 11 families of fern and fern allies in the Achanakmar-  
Amarkantak Biosphere Reserve area the most common family reported in this study is Pteridaceae (4 species), Selaginellaceae (3 species), while Davalliacaeae (2 species) and families Dryopteridaceae, Polypodiaceae, and Woodsiaceae represented 1 species each (Fig. 3ii). Among the listed pteridophytes (table 1) 17 species (89%) (Fig. 3iii) are used for health care problems of tribal women. Out of which 4 species for irregular menstruation, 1 species for dysmenorrheal (painful menstruation), 2 for amenorrhea (absence or suppression of normal menstrual flow) and for menorrhagia (heavy menstrual bleeding) 1 species can be utilize. 3 species are used as female contraceptive or abortifacient. *Blechnum orientale* L. may be cause total sterility in women. 5 species may be used for conception or to remove infertility, 1 species is used for curing Uterine hemorrhage, 4 species can cure gonorrhea, 3 species used in curing leucorrhoea, 2 species used to facilitate easy child birth, 3 species for post-partum care/strengthening. 2 species used as aphrodisiac agent. 2 species (11%) are used for beauty care practices by the tribal women (Fig. 3iii). Out of which 1 species used for hair treatment/alopca (hair loss) and 1 species for facial mask. Out of 17 species of ferns utilized for the herbal preparation 65% are common, 29% are occasional and only 6% are rare to the area (Fig.3iv). The women are found to be more familiar with the use of various medicinal pteridophytes. It is apparent that the community is rich in ethnomedicinal knowledge and the knowledge is being transmitted from generation to generation. There is a great need to create awareness among the communities about endangering pteridophytic plants, if over exploited to meet market demand. Improved awareness of conservation issues is needed. In the lack of proper education, excessive collection, rapid industrialization and biotic interference, their number are likely to be decreasing continuously; therefore an urgent need was felt to study and document this precious knowledge for posterity. Over exploitation of medicinally/economically important species like *Selaginella bryopteris, Blechnum orientale, Dryopteris cochleata, Pleopeltis macrocarpa* etc. from the forests by the visitors and local people for medicinal purpose and during excursions also increases the pressure on these plants. As the causal factors leading to depletion of species are immense and continued, further efforts are required to document more such taxa from the field. In view of this the factors leading to depletion of species in the forest area has been studied. Both types of conservation (ex-situ & in-situ) and multiplication measurements are proposed to preserve the pristine wealth of this area. The local tribes of the region are cultivating them in abandoned sites of shifting agriculture and also in scared groves as in situ conservation of biodiversity and ecological
restoration. Habitat preservation is important and only way to save these taxa because a little habitat disturbance may be cause extinction of the taxa. For ex situ conservation special efforts are not given much to the case of pteridophytes when compared to the flowering plants. In majority of the gardens there are very few ferns which are grown mostly as ornamental ferns and not as a medicinal ferns. The ex situ conservation of medicinally important ferns may be strengthened by setting up more and more ferneries in different parts of the country particularly near by the sanctuary or biospheres. The ex situ conservation through in vitro tissue culture or spore culture has to be done at least in the some medicinally important species like Selaginella bryopteris, Nephrolepis cordifolia, Lygodium flexuosum etc. Public awareness programme should be intensified, which not only be improve the socio economic status and livelihoods of local tribal women but also support forest conservation.

Figure 2. (i) Actiniopteris radiata (Sw.) Link; (ii) Blechnum orientale L.; (iii) Cheilanthes farinosa (Forssk.) Kaulf.; (iv) Diplazium esculentum (Retz.) Sw.; (v) Equisetum ramosissimum Desf. ssp. debile; (vi) Lygodium flexuosum (L.) Sw. (vii) Nephrolepis cordifolia (L.) C. Presl (viii) Ophioglossum reticulatum L. (ix) Selaginella bryopteris (L.) Bak. (x) Plant parts sold in local market; (xi) Interaction with local healer (xii) Forest area in Achanakmar-Amarkantak Biosphere Reserve
Table 1: Pteridophytes in Women’s health and beauty care practices

<table>
<thead>
<tr>
<th>S.No.</th>
<th>In women’s health care problems</th>
<th>Botanical name</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Irregular menstruation</td>
<td>1. Adiantum philippense L.</td>
<td>Fronds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Cheilanthes farinosa (Forsk.) Kaulf.</td>
<td>Fronds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Nephrolepis exaltata (L.) Schott</td>
<td>Rhizome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Ophioglossum reticulatum L.</td>
<td>Leaves</td>
</tr>
<tr>
<td>2.</td>
<td>Dysmenorrhea (painful menstruation)</td>
<td>1. Lygodium flexuosum (L.) Sw.</td>
<td>Rhizome</td>
</tr>
<tr>
<td>3.</td>
<td>Amenorrhoe/Emmenagogue (absence or suppression of normal menstrual flow)</td>
<td>1. Selaginella ciliaris (Retz.) Spring</td>
<td>Whole plant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Selaginella repanda (Desv. ex Poir.) Spring</td>
<td>Leaves</td>
</tr>
<tr>
<td>4.</td>
<td>Menorrhagia (heavy menstrual bleeding)</td>
<td>1. Lygodium flexuosum (L.) Sw.</td>
<td>Leaves</td>
</tr>
<tr>
<td>5.</td>
<td>Female contraception/Abortifacient</td>
<td>1. Actiniopteris radicata (Sw.) Link</td>
<td>Leaves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Adiantum philippense L.</td>
<td>Rhizome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Ploegelia macrocarpa (Bory ex Willd.) Kaulf.</td>
<td>Whole plant</td>
</tr>
<tr>
<td>6.</td>
<td>Causing total sterility</td>
<td>1. Blechnum orientale L.</td>
<td>Leaves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Nephrolepis cordifolia (L.) Presl</td>
<td>Rhizome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Nephrolepis exaltata (L.) Schott</td>
<td>Rhizome</td>
</tr>
<tr>
<td>7.</td>
<td>For conception/to remove infertility</td>
<td>1. Actiniopteris radicata (Sw.) Link</td>
<td>Leaves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Cheilanthes albomarginata C.B. Clarke</td>
<td>Fronds</td>
</tr>
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<td></td>
<td></td>
<td>3. Lygodium flexuosum (L.) Sw.</td>
<td>Rhizome</td>
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<td></td>
<td></td>
<td>4. Selaginella bryopteris (L.) Bak.</td>
<td>Leaves</td>
</tr>
<tr>
<td>8.</td>
<td>Causing total fertility</td>
<td>1. Ophioglossum reticulatum L.</td>
<td>Whole plant</td>
</tr>
<tr>
<td>9.</td>
<td>Gonorrhea</td>
<td>1. Dryopteris cochlaisia (D.Don) C.Chr.</td>
<td>Whole plant</td>
</tr>
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<td></td>
<td></td>
<td>2. Equisetum ramosissimum Desf. ssp. debile</td>
<td>Rhizome</td>
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<tr>
<td></td>
<td></td>
<td>3. Lygodium flexuosum (L.) Sw.</td>
<td>Rhizome</td>
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<td></td>
<td></td>
<td>4. Selaginella bryopteris (L.) Bak.</td>
<td>Leaves</td>
</tr>
<tr>
<td>10.</td>
<td>Leucorrhea</td>
<td>1. Actiniopteris radicata (Sw.) Link</td>
<td>Leaves</td>
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<tr>
<td></td>
<td></td>
<td>2. Ophioglossum reticulatum L.</td>
<td>Whole plant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Selaginella bryopteris (L.) Bak.</td>
<td>Leaves</td>
</tr>
<tr>
<td>11.</td>
<td>Birth-aid in parturition/ Facilitate easy child birth</td>
<td>1. Diplazium esculentum (Retz.) Sw.</td>
<td>Leaves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Nephrolepis exaltata (L.) Schott</td>
<td>Rhizome</td>
</tr>
<tr>
<td>12.</td>
<td>Post-Partum care/strengthening</td>
<td>1. Actiniopteris radicata (Sw.) Link</td>
<td>Leaves</td>
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<tr>
<td></td>
<td></td>
<td>2. Selaginella bryopteris (L.) Bak.</td>
<td>Leaves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Ophioglossum reticulatum L.</td>
<td>Leaves</td>
</tr>
<tr>
<td>16.</td>
<td>Aphrodisiac/ Sexual vigor</td>
<td>1. Actiniopteris radicata (Sw.) Link</td>
<td>Leaves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Marsilea minuta L.</td>
<td>Leaves</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S.No.</th>
<th>In beauty care practices</th>
<th>Botanical name</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hair tonic/stop hair loss/hair graying and remove dandruff</td>
<td>Adiantum philippense L.</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>2.</td>
<td>In cosmetic uses/facial mask</td>
<td>Blechnum orientale L.</td>
<td>Leaves</td>
</tr>
</tbody>
</table>

Figure 3. (i) Statistics of different plant parts; (ii) Frequency of species in the families; (iii) Proportion of species utilize in women’s health/beauty care practices; (iv) Frequency of occurrence of the plant species.
CONCLUSION
Conclusion of this investigation is to collect the information based on pteridophytes commonly used by the women of ethnic communities in heath and beauty care practices and document them at one place which may be lost if not properly documented. This study also describes the significant role of ethnic women who are utilizing and conserving the pteridophytic biodiversity in and around localities of their natural habitat in Achanakmar-Amarkantak Biosphere Reserve. This knowledge is handed down to generations through mother to daughter and this data can be used in future for more studies and research on pharmacological and clinical level. Furthermore, research related to chemical screening should also be initiated to analyses the chemical contents of medicinal plants and the implications on health. In addition to medicinal use, plant resources can be linked to the preservation of biodiversity and alleviation of poverty. This paper will explore the participation of tribals in utilization and conservation of pteridophytic biodiversity in the forest.

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