Medicinally important Pteridophytic flora of Hamirpur district, Himachal Pradesh, India

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ABSTRACT

Pteridophytes are the first land vascular plants. They include true ferns and fern allies. This group of plants constitutes second major component of forest wealth after angiosperms. They occupy intermediate position between bryophytes and phanerogams. Medicinal uses of pteridophytes are known to man for more than 2000 years. The pteridophytes are used in homeopathic, ayurvedic, tribal and unani system of medicines. There is dearth of documentation of pteridophytes and their medicinal potential in reference to Hamirpur district. Hence, the present study was undertaken. During the present study 21 species of pteridophytes have been identified and documented as medicinally important for different ailments. This study was carried out between January 2019 to October 2023 in Hamirpur district, Himachal Pradesh, India. This study may be utilized for bioprospecting by pharmaceutical industry in future.

Key words: Pteridophytes, Documentation, Medicinal potential, Bioprospecting, Pharmaceutical industry.

Introduction

Plants have been used for the treatment of several ailments since earliest times. All over the world people have practiced the use of botanicals as a source of medicines for millenia. Over 25 percent approved drugs in industrialized countries are obtained directly or indirectly from plants (Newman et al., 2000). In modern times, the search for phytochemicals with antioxidant, antimicrobial or anti-inflammatory properties is rising owing to their potential as a remedy for the cure of several chronic and infectious diseases (Halliwell, 1996). Therapeutic plants may be a better source of antimicrobial agents due to less side effects than synthetic antibiotics (Berahou et al., 2007). Plant extracts contain several secondary metabolites like phenolics that enhance biological activity. Due to antimicrobial and antioxidant properties plant secondary metabolites, some of them are considered to be safe substances (Proestos et al., 2005). Pteridophytes comprise of fern and their allies. There are about 12,000 species spread among 250 different genera all over the world (Chang et al., 2011). In India, about 1,107 species of pteridophytes have been reported (Fraser-Jenkins et al., 2017). The pteridophytes are suggested as a source of medicines in Ayurvedic, Unani and Homeopathic systems of medicine (Uddin et al., 1998). Several ferns are recommended by the native doctors of traditional Chinese system of medicine (Kimura and Noro, 1965). Recently, ethnobotanical and pharmacological studies have been carried out on ferns and their allies by several workers (Dhiman, 1998; Vasudeva, 1999; Reddy et al., 2001; Singh et al., 2001; Gogoi, 2002; Chen et al., 2005; Parihar and Parihar, 2006; Benjamin and Manickam, 2007; Singh et al., 2008a, 2008b; Perumal, 2010; Singh and Upadhyay, 2014; Agnihotri, 2016;
Suraj et al., 2020; Das and Patra, 2021; Giri et al., 2021; Ojaha and Devkota, 2021; Bandyopadhyay and Dey, 2022). There is dearth of documentation of pteridophytes and their medicinal potential in reference to Hamirpur district of Himachal Pradesh, India. Hence, the present study was undertaken with the objective to document diversity and potential medicinal uses of fern and their allies of Hamirpur district of Himachal Pradesh, India.

Materials and Methods

The present study was carried out between January 2019 to October 2023 in different seasons from various parts of Hamirpur district of Himachal Pradesh. It was based on field study, collection of fern and fern allies with a critical study in different seasons from various parts of district Hamirpur, Himachal Pradesh, India. In majority of pteridophytes, new fronds start appearing from June to July and sori appear from late August. Hence, collections were made from mid of September onwards. During field collections important features of rhizomes, scales, hair, branching system of fronds and structure of sori were recorded along with photography. The collected specimens were dried and preserved in herbarium sheets according to Jain and Rao (1976). The specimens were identified with the help of standard literature and various published works (Khullar, 2000; Ghosh et al., 2004; Singh and Panigrahi, 2005; Fraser-Jenkins, 2008) and medicinal uses were documented by interacting with local people and consulting the standard literature.

Results and Discussion

The present study revealed 21 species of potential medicinal pteridophytes belonging to 17 genera and 15 families for the treatment of various human diseases. Hamirpur district is rich in biodiversity and to harness medicinal potential of fern and their allies need further study. The present exploration may be
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Botanical Name Common Name</th>
<th>Family</th>
<th>Part Used</th>
<th>Medicinal Uses</th>
<th>References</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Adiantum capillus</em> Maidenhair fern</td>
<td>Adiantacae</td>
<td>Whole plant</td>
<td>Used as laxative, tonic, in cold and cough, snake bite, hair growth, fever and menstrual irregularities</td>
<td>Joshi &amp; Joshi, 2008; Kunwar <em>et al.</em>, 2008; Bhagat and Shrestha, 2010</td>
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<td>5.</td>
<td><em>Asplenium dalhousiae</em> Spleenwort</td>
<td>Aspleniaceae</td>
<td>Fronds</td>
<td>Have Antifertility, anticancerous and antibacterial properties</td>
<td>Singh, 2003; Abbas <em>et al.</em>, 2019; Al-Assar <em>et al.</em>, 2021</td>
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<td>6.</td>
<td><em>Azolla pinnata</em> Mosquito fern</td>
<td>Azollaceae</td>
<td>Leaves</td>
<td>Antibacterial and antioxidant properties</td>
<td>Jacob <em>et al.</em>, 2020</td>
</tr>
<tr>
<td>7.</td>
<td><em>Ceratopteris thalictroides</em> Water sprite fern</td>
<td>Parkeriaceae</td>
<td>Leaves and roots</td>
<td>Used as poultice against skin ailments</td>
<td>Bhatt <em>et al.</em>, 2021</td>
</tr>
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<td>11.</td>
<td>Hypodematiun crenatum (Forssk.) Kuhn</td>
<td>Crenate shield fern</td>
<td>Hypodematia-ceae</td>
<td>Fronds and rhizome</td>
<td>Facilitate conception in women, antibacterial</td>
</tr>
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<td>12.</td>
<td>Lygodium flexuosum (L.) Sw.</td>
<td>Climbing fern</td>
<td>Lygodiaceae</td>
<td>Whole plant</td>
<td>Used in jaundice, wound healing, expectorant, rheumatism, sprain, scabies, ulcer, cough, piles, gonorrhea, fever, antiovulatory, dysmenorrhea, female infertility and eczema</td>
</tr>
<tr>
<td>13.</td>
<td>Marsilea minuta L.</td>
<td>Water clover</td>
<td>Marsileaceae</td>
<td>Whole plant</td>
<td>Used in cough, fever, leprosy, diuretic, emollient, anodyne, opthalmic, aphrodisiac, febrifuge, dyspepsia, muscle spasm, insomnia, indigestion and diarrhoea</td>
</tr>
<tr>
<td>14.</td>
<td>Onychium contiguum Wall. ex C. Hope</td>
<td>Washfield cat’s claw fern</td>
<td>Cryptogramm-aceae</td>
<td>Fronds</td>
<td>Used in urinary tract infections</td>
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<tr>
<td>15.</td>
<td>Pronephrium penangianum (Hook.) Holtt.</td>
<td>Chinese peng fern</td>
<td>Thelypterida-ceae</td>
<td>Rhizome</td>
<td>Used to relax muscles and tendons, promote blood circulation, stop bleeding and pain reliever</td>
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<td>16.</td>
<td>Pteris cretica L.</td>
<td>Ribbon fern</td>
<td>Pteridaceae</td>
<td>Fronds</td>
<td>Used in wound healing and has antibacterial properties</td>
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<td>17.</td>
<td>Pteris vittata L.</td>
<td>Chinese ladder brake fern</td>
<td>Pteridaceae</td>
<td>Whole plant</td>
<td>Used in tongue sore, burns, anticancerous, antioxidant, antiviral, antibacterial, demulcent, hypotensive and tonic</td>
</tr>
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<td>18.</td>
<td>Selaginella chrysoscoaclub moss</td>
<td>Christmas clubmoss</td>
<td>Selaginellaceae</td>
<td>Whole plant &amp; spores</td>
<td>Antibacterial</td>
</tr>
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<td>19.</td>
<td>Tectaria coadunata (J. Sm.) C. Chr.</td>
<td>Halberd fern</td>
<td>Tectariaceae</td>
<td>Fronds &amp; rhizome</td>
<td>Used in asthma, insect bites, diarrhoea, bronchitis, gastrointestinal disorders, eradication of worms in children,</td>
</tr>
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<td>21.</td>
<td><em>Thelypteris prolifera</em> (Retz.) C. F. Reed</td>
<td>Scrambling fern</td>
<td>Thelypteridaeae</td>
<td>Fronds</td>
<td>Used against female infertility and antibacterial</td>
</tr>
</tbody>
</table>

Acknowledgement

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Conflict of Interests

There is no conflict of interests regarding research, authorship and publication of this research article.

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