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Phytochemical analysis of *Angiopteris evecta*

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Abstract
The Western Ghats of India is well known for its biodiversity. The Pteridophytes are important but much ignored group from this region. This paper deals with qualitative analysis of secondary metabolites from *Angiopteris evecta* (G.Forst) Hoffm, The qualitative analysis of powdered extracts was carried out with reference to saponins, phenols, tannins, phytosterols, triterpens, alkaloids terpenoids., etc. Plants contain numerous biologically active compounds, many of which have exhibited antimicrobial properties. Over the past few years, strains of many pathogenic species resistant to all widely available antibiotics have emerged and proliferated. The antibiotics are sometimes associated with adverse effects on hosts, which include hypersensitivity, immunosuppression, allergic reactions and depletion of beneficial gut and mucosal microbes. As in human, reports of antibiotic resistant bacteria emerging in animal populations are appearing with increasing frequency. In many parts of the world plants are used for antibacterial, antifungal and antiviral medicine. The extracts were used as a source of medicinal agents to cure urinary tract infections, cervicitis, vaginitis and gastrointestinal disorders. In this study the *Angiopteris evecta* was collected from the mid-western Ghats of Hosanagra and Thirthalli, Shivamogga District, Karnataka State, India. 80% ethanol extracts of collected plants.

Keywords: *Angiopteris evecta*, Western Ghats, secondary metabolites, phytochemical

Introduction
India is rich in its diversified flora and fauna. Plants are integral part of nature. Nature reflects the creative power of living god. Plants have an almost endless variety of metabolites which is very useful to human beings. Ferns appear to have fewer taxonomically informative morphological characters than seed plants because they lack flowers, which provide valuable characters for analyzing evolutionary relationships. The importance of plants is well known to us. Plant kingdom is a treasure house of potential drugs and in the recent years there has been an increasing awareness about the importance of medicinal plants. Drugs from the plants are easily available, less expensive, safe, and efficient and rarely have side effects. Plants produce a remarkably diverse array of over 50000 low molecular mass natural products also known as secondary metabolites4. Finding new secondary metabolites is a prerequisite for the development of novel pharmaceuticals. This Thematic Series on the biosynthesis and function of secondary metabolites deals with the discovery of new biologically active compounds from all kinds of sources, including plants. Secondary metabolites present in plants have been linked with the healing properties of plants. In addition to their active ingredients pteridophytic plants contain minerals, vitamins, alkaloids, saponins, phenols, tannins, phytosterols, triterpens, terpenoids. Substances those are important in supporting a particular activity in plants. These metabolites are said to be useful to the plant itself but can be toxic to animals including man. For this qualitative analysis extraction method was used. This method involves the separation of medicinally active portions of plants tissues by using selective solvents. Therefore, in present study four common plants which belong to the order filicales were selected for qualitative analysis of secondary metabolites. Phytochemistry is one of the rapidly expanding areas of Plant Taxonomy which utilizes chemical Information to improve the classification of plants. Plants are endowed with various phytochemical molecules such as vitamins, flavanoids, phenolic acids, lignins, tannins, flavanoids, terpenoids, quinones, coumarins, alkaloids, amines, betalains and other metabolites which are rich in antioxidant activity. Natural compounds may be considered alternative means for medicine, because of low or little toxicity due to their dietary properties or their long history as herbal medicines. In recent years identification and validation of the potential benefits of phytocompounds has become as important area of Pharmaceutical Science. These secondary plant metabolites previously with unknown pharmacological activities have been extensively investigated as a source of medicinal agents. The antioxidant compounds possess anti-inflammatory, anti atheroscleryic, anti tumour, anti mutagenic, anti carcinogenic, anti microbial and antiviral activities. The ingestion of natural antioxidants has been associated with reduced risks of cancer, cardiovascular disease, diabetes and other diseases associated with aging. In the plant World, Pteridophytes are said to be primitive vascular plants and provide important contribution to Earth's Plant Diversity. Pteridophytes are not infected by microbial pathogens, which may be one of the important factors for the evolutionary success of pteridophytes and the fact that they survived for more than 350 million years. They are found scattered all over the globe and quite many of them occur in India. Many ferns among many other plants were used for medicinal purposes by the early Greeks and Romans and through the middle ages. Phytochemical analysis has been done in large scale in flowering plant as compared to non flowering plants. Most of the phytochemical works on Indian fern pertain to the primary metabolites. Medicinal ferns are gaining importance in recent days by the fact that several medicinal ferns from

India have been subjected to phytochemical analysis. Modern Biological and pharmaceutical studies were carried out on Pteridophytes by different workers.

Materials and Methods

Collection of Samples

Samples were collected from the mid-western Ghats of Hosanagra and Thirthalli, Shivamogga District,Karnataka State, India. based on their richness in the month of November. Plants of limited population were avoided in order to conserve them. Samples were identified as *Angiopteris evecta* and *Blechnum orientale* L.

Preparation of plant extract

The air-dried plant material was ground and used for preparing extracts. 20 grams of powdered plant material was extracted with 80% ethanol by maceration and kept it for a period of 24 hours at room temperature. The resultant extract could be called as cold extract. The extracts were filtered using Whatman No. I filter papers and each extract was concentrated in a rotary evaporator to remove alcohol. Each cold extract was dissolved in sterile distilled water to obtain a sample concentration of 100 mg/ml (Cos *et al*., 2002).

Plant extracts for second level of evaluation

The air-dried plant material was ground and used for preparing extracts. About 50 g of powdered plant material was successively extracted using petroleum ether (60-80oC) (relative polarity 0.117), acetone (relative polarity 0.355), methanol (relative polarity 0.762) and water (relative polarity 1.000) for a period of 24 hrs (Eloff, 1998). The extracts were filtered using Whatman No. I filter papers and each extract was concentrated in vacuum using rotary evaporator at 40oC to remove the last trace of solvent. The solid material was dissolved in the same solvent to obtain a sample concentration of 50 mg/ml.

Preliminary detection of phytochemicals

Alkaloids were detected by Iodine Potassium iodide reagent (Stahl, 1969), Dragendroff reagent (Thies and Reuther, 1954, Tyihak, 1964) and Margui reagent (Harborne, 1973). Presence of flavonoids was detected by spraying with 25% aqueous solution of basic lead acetate yielded fluorescence in long wave U.V light (Horhammer *et al*., 1964). Spraying 1% aluminium chloride solution in ethanol yielded yellow fluorescence in long wave U.V light (Gage *et al*., 1951) indicated the presence of flavonoids. Phenols were detected by spraying TLC plates with saturated aqueous silver nitrate solution; light pink to deep green spots were yielded after spraying (Burke *et al*., 1960). Undiluted Folin ciocalteu reagent was sprayed in order to find out phenols (Keith *et al*., 1958). Stannic chloride was used to detect titerpenes, sterols and steroids, phenol and poly phenols (Scheideggeer and Cherbuliez, 1955). Anisaldehyde-sulphuric acid reagent was used to detect terpenes, steroid and sugars (Stahl and Kaltenbach, 1961).

Qualitative Analysis of Secondary Metabolites of The Plant Extracts Following tests were carried out for analysis: Phytochemical testing for the presence of various compounds by standard methods like Anthocyanins and Leucoanthocyanins, Steroids, Benedict's test forreducing sugar, Hager's test,Mayer's test,Wagner's test and Dragendroff's test for Alkaloid, Tannins, Saponins, Terpenoids by Salkowski test and compounds like Phenols, Flavonoids, Quinons, Cellulose, Glycosides and Triterpenes compounds by Khandelwal were conducted.

Results and Discussion:

Nature has been a source of medicinal agent for thousands of years and an impressive number of modern drugs have been isolated from natural sources. Plants have the ability to produce a large variety of secondary metabolites such as saponins, tannins, phenols, alkaloids, triterpens and phytosterols, In present qualitative analysis of four pteridophytic plants from filicales order shows presence of saponins and Phytosterols in Angiopteris evecta. Phenols possess biological properties such as antiapoptosis, antiaging, anticarcinogen, anti-inflammation, anti-atherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhibition of angiogenesis and cell proliferation activities. Tannins are present in Angiopteris, Tannins are reported to have various physiological effects like anti-irritant, anti-secretolytic, anti-phlogistic, anti-microbial and anti-parasitic effects. Phytotherapeutically, tannin containing plants are used to treat nonspecific diarrhoea, inflammations of mouth and throat and slightly injured skins. Angiopteris shows positive result for triterpens. Angiopteris, shows positive result for alkaloids. Alkaloids, saponins, tannins, quinones of compounds are known to have curative activity against several pathogens and therefore could suggest the use traditionally for the treatment of various illnesses. In recent years, secondary plant metabolites extensively investigated as a source of medicinal agents.It is evidence from result that this qualitative analysis of secondary metabolites saponins, tannins, phenols, terpinoids, glycosides, quinonesugars, triterpens, phytosterols and alkaloids are abundant.

Table 1: Phytochemical contents of ethanolic extract of ferns studied

Secondary metabolites	*Angiopteris evecta*
Saponin	+
Tannin	+
Phenol	+
Steroids	-
Terpinoids	-
Flavonoids	-
Glycosides	-
Quinone	-
Sugar	-
Triterpens	+
Phytosterol	+
Alkaloids	
(a). Mayer's test	+
(b). Wagner's test	+
(c).Dragendroff's test	-
(d). Picric acid test	-

The symbols indicates [+] present; and [-] absence.

Conclusion

From the above study, it is concluded that these pteridophytic plants containing some valuable secondary metabolites and it increases the value of plants in case of medicines.

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