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A COMPARATIVE PHYTOCHEMICAL SCREENING OF FOUR EPIDENDROID ORCHIDS OF KERALA, INDIA

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Abstract

In the present study, four orchids belonging to the largest sub-family Epidendroideae, namely *Bulbophyllum mysorensis, B. sterile, Eria pauciflora,* and *E. pseudoclavicaulis* were subjected to preliminary phytochemical analysis using their acetone extracts obtained with the help of Soxhlet apparatus. The results indicated that all the four plants were rich in phytochemical constituents, with maximum six secondary metabolites, in the leaves followed by the pseudobulbs, in all the four species. The diversity of phytochemicals present in these orchids proved that they are medicinally important as also reported during ethnobotanical studies. Further, quantitative estimation and pharmacognostical studies would help in assessing their true potential as pharmaceutical drugs.

Introduction

ORCHIDS ARE indeed precious due to the exquisite beauty, peculiar shapes and durability of their flowers. The economic importance of orchids lies mainly in their ornamental value but many orchids are also used in traditional medicine systems. These plants are well-known for their medicinal and therapeutical properties and these have been attributed to their phytochemical contents (Pathak *et al.,* 2010). Historically, utilization of orchids by humans probably started with their use for medicinal purposes; many are used in traditional system of medicine as a remedy for a number of ailments. Marjoka (2016) worked on phytochemical screening of three medicinally important epiphytic orchids of Bangladesh. Pai *et al.* (2015) assessed the apoptosis-inducing potential and anti-tumour activity of the active fraction of *Bulbophyllum sterile* leaves during *in vitro* and *in vivo* studies; Dichloromethane fraction increased the mean life span in Ehrlich Ascites Carcinoma (EAC) inoculated mice and increased the hepatic antioxidant levels. Maridass (2008) conducted a phytochemical survey of orchids in the Tirunelveli hills of South India. The present study was aimed to screen the phytochemical constituents of *Bulbophyllum mysorensis* (Rolfe) J. J. Sm., *B. sterile* (Lam.) Suresh*, Eria pauciflora* Wight, and *E. pseudoclavicaulis* Blatt. & McCann. The studies on phytochemical analysis will help in identification as well as their taxonomic relationship and affinities.

Materials and Methods

The orchid plants were collected from different parts of Idukki and Ernakulam districts of Kerala, India and these were identified as *Bulbophyllum mysorensis*, *B. sterile, Eria pauciflora,* and *E. pseudoclavicaulis*. The plant materials were first washed and then separated into leaves, roots and stems with pseudobulbs. They were cut into small fragments; these materials were then shade dried to prevent the loss of active phyto-constituents. After drying, each one was separately ground into fine powder, using a grinder. The powdered pseudobulbs, stems, leaves and roots of the orchid plants were subjected to successive extraction with the solvent acetone with the help of Soxhlet apparatus for 6 hrs and each powdered sample weighing 20 gms was extracted using 200 ml of acetone solvent. After 6 hrs, the filtrate was cooled down to room temperature and stored in the refrigerator, for further studies. Preliminary phytochemical screening was carried out using acetone extract of *Bulbophyllum mysorensis*, *B. sterile, Eria pauciflora,* and *E. pseudoclavicaulis* so as to test the presence of the various secondary metabolites such as alkaloids, coumarins, glycosides, phlobatannins, quinones, flavonoids, anthocyanins, tannins, phenols, saponins, terpenoids and steroids. The analysis was performed according to the standard procedure following Evans (2002), Harborne (1998), and Sofowora (2008).

Results and Discussion

In the present investigation, successive Soxhlet extractions were carried out with acetone solvent followed by phytochemical analysis revealing the presence of alkaloids, coumarins, glycosides, quinones, flavonoids, tannins, phenols, terpenoids, carbohydrates and saponins in the various parts namely roots, leaves, stems and pseudobulbs of the plants. In both

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Table 1. Phytochemical screening of four Epidendroid orchids.

Phytochemicals	Orchid species											
	Bulbophyllum mysorensis			*B. sterile*			*Eria pauciflora*			*E. pseudoclavicaulis*		
	Root	Leaf	Pseudobulb	Root	Leaf	Pseudobulb	Root	Leaf	Pseudobulb	Root	Leaf	Pseudobulb
Alkaloids	+	+	+	+	+	-	+	+	+	-	-	-
Coumarins	-	-	-	-	+	-	-	-	-	+	-	+
Glycosides	-	+	-	-	+	-	-	-	+	-	-	+
Quinones	+	+	+	-	-	-	+	+	+	+	+	-
Flavonoids	+	-	-	+	-	-	+	+	+	-	-	-
Phenols	-	+	-	-	+	-	+	+	+	-	-	-
Saponins	+	+	+	-	+	+	+	+	+	-	-	-
Terpenoids	-	-	-	-	-	-	-	-	-	+	-	+
Tannins	-	+	-	+	+	+	+	-	-	-	-	-
Anthocyanins	-	-	-	-	-	-	-	-	-	-	+	-
Steroids	-	-	-	-	-	-	-	-	-	-	+	+
Phlobatannins	-	-	-	-	-	-	-	-	-	-	-	+

+, Present; -, Absent.

Bulbophyllum mysorensis and *Eria pauciflora*, alkaloids were found to be present in all the extracts (root, leaf, stem and pseudobulb) while positive results were obtained only in the root and leaf extracts of *Bulbophyllum sterile.* Alkaloids are formed as metabolic byproducts and have been reported to be responsible for antibacterial activity (Doughari, 2006). Acetone extracts of stem and bulbs of *Eria pauciflora*, the leaf extracts of *Bulbophyllum mysorensis* and *B. sterile,* and the bulb extract of *E. pseudoclavicaulis* indicated the presence of glycosides. Quinones were found to be present in all the extracts of *E. pauciflora* and *B. mysorensis,* while in *E. pseudoclavicaulis,* they were present only in the roots and leaves. Quinones contain anticancer drugs, adriamycin, danorubicin, carminomycin, rubidazone, nogalamycin, aclacinomycin A, and steffimycin; mitomycin C and streptonigrin; and lapachol which interact with mammalian microsomes and function as free radical carriers. Root, leaf and pseudobulb extract of *E. pauciflora*, root extracts of *B. mysorensis* and *B. sterile* indicated the presence of flavonoids. These are hydroxylated phenolic substances known to be synthesized by plants in response to microbial infection and it should not be surprising that they have found *in vitro* to be effective antimicrobial substances against a wide array of microorganisms. Their activity is probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell wall (Marjorie, 1999). All the extracts of *E. pauciflora* and *B. mysorensis*, and the leaf and pseudobulb extracts of *B. sterile* indicated the presence of saponins. The presence of saponins indicated antidiarrhoeal, antihelminthic, and anticancerous activity of plants (Sutar *et al*., 2010). Anthocyanins and phlobatannins were found only in the leaf and pseudobulb extracts of *E. pseudoclavicaulis* respectively while steroids were found in both (Table 1).

A well planned scientific enquiry by incorporating phytochemical, pharmacological and controlled clinical trials is required which will help in identifying the potential active principles. This may also further help to evolve therapeutic potential of orchids and bring out orchid herbal therapies for the well-being of mankind (Kumari *et al*., 2012).

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