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Preliminary Phytochemical Analysis of *Elytraria acaulis* (Lf) Lindau

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Abstract

A qualitative study to evaluate the phytochemical constituents in aqueous and methanol leaf extracts of *Elytraria acaulis* was done by following standard qualitative phytochemical screening methods. The preliminary phytochemical analysis of *Elytraria acaulis* leaves showed the presence of carbohydrates, protein, alkaloids, tannins, glycosides, terpenoids, phenols, flavanoids, steroids and saponins in both the extracts compared to aqueous extract where saponins, steroids, alkaloids and carbohydrates were absent. The leaves of *Elytraria acaulis* might ensure phyto constituents source with stable, biologically active components that can establish a scientific base for synthesis modern medicine in future.

Keywords: Acanthaceae, *Elytraria acaulis*, Flavanoids, Phytochemical Screening, Saponin and Anti Inflamatory, Tannins

1. Introduction

Plants are fundamental to life. Plants form the basis of chemical towards medicine. Use of plants for medicine has been reported from pre-historic period for its amazing therapeutic value. There is a vast demand on wealth of medicinal plants exploration since plants may contain active compounds to cure disease. The increase demands of natural products to treat the fast growing infectious disease, herbal medicine make this a best and safe solution. (Merina Paul Das, 2016). Literature tells us their usage as traditional health remedies is the most popular for 80% of world population in Asia, Latin America and Africa. (Bibitha *et al.*, 2002 and Maghrani *et al.*, 2005). Herbal medicine is dominant practise to about 75-80% of the world population.

Bioactive compounds from of plant origin like phytochemicals and secondary metabolites like alkaloids, saponins, steriods, flavonoids and tannins explicit a wide range of medicinal properties (Sundar *et al.*, 2015). Such active compounds produced during secondary metabolism are make the plants naturally medicinal in nature which supports the use of plant species worldwide for different purposes, including treatment of adverse disease conditions. With this view *Elytraria acaulis* was selected to exploit its medicinal properties through phytochemical studies.

The plant species *Elytraria acaulis* traditionally used as medicinal plant species has an anti inflammatory, antioxidant and antidiabetic activity. It has high reputation in Ayurveda, Unani, Siddha and traditional Chinese medicine and also traditional healer in Central and South America. The *E. acaulis* plant is used for medicinal purposes, traditional medicine for the treatment of diarrhoea, rickets, leucorrhoea and throat complaints (Babu *et al.*, 2015).

Additionally this plant has many properties like anthelmintic, antifertility, anti- hyperglycemic, antimicrobial, analgesic, antioxidant, larvicidal and hepatoprotective activities (Babu *et al.*, 2015) which may be useful in developing new formulations with more therapeutic value. Pertaining to the rich medicinal properties of this plant the present work aims drawing attention towards the unexplored potentials of this plant species.

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2. Materials and Methods

2.1 Collection of Plant Material

Elytraria acaulis leaves were collected in the month of November 2019 from the "Foothills of Vedhagiri Hills", Erode District. The plant species was identified with the help of "The Flora of Presidency of Madras".

2.2 Morphological Description

Elytraria acaulis is a stem less perennial herb with one to several unbranched flowering stem up to 30 cm tall. Leaves in a basal rosette, sub sessile, elliptic to obovate up to 18 cm long, hairy, particularly on the veins below; margin crenate, scalloped in the upper part. Flowers small, white in colour, in simple or branched spikes, scapes 10-20 cm long, covered by spirally imbricate bracts. Bracts and flowering stem bluish green, corolla white, lower lip and lateral lobes spreading, bilobed. Flowers often not opened. Capsule 5.5-6.5 mm long, hairless capsule rigid, valves branched and scape, sometimes very tall. Flowering and fruiting takes place during July–September or November.

Plate 1. **a)** Habit of *Elyteraria accaulis* (Lf) Lindau.

2.3 Preparation of Powder

The collected plant material was washed cleanly in tap water and then air dried under shade condition at room temperature (25°C) for 2-3 weeks until they become brittle. After complete drying, the plant material was ground to coarse powder.

Plate 1. **b**) Leaf Powder of *Elyteraria accaulis* (Lf) Lindau.

2.4 Preparation of Extract

10 gms of powdered leaves of *Elytraria acaulis* was soaked in a glass percolar with methanol and aqueous in separate containers and allowed to stand at room temperature over night for soaking. Then the percolate was collected, filtered and concentrated at 45°C under vacuum. The obtained semisolid extracts were used for further studies.

3. Qualitative Phytochemical Analysis

The methanolic and aqueous extracts were screened to confirm the presence of phytoconstituents like carbohydrates, proteins, alkaloids, phenols, tannins, flavonoids, terpenoids, glycosides, steroids and saponins by using following tests. The tests were based on the visual observations of colour change or formation of precipitate after addition of specific reagents.

4. Priliminary Phytochemical Studies

4.1 Test for Carbohydrates (Anthrones Test)

5 ml Anthrone reagent was added to 3 ml of sample seperately. The formation of yellow colour indicates the presence of carbohydrates.

4.2 Test for Proteins (Ninhydrin Test)

To the 3 ml of test sample few drops of Ninhydrin was added and boiled for few minutes.

The presence of the compound was indicated by the formation of blue colour.

4.3 Test for Alkaloids (Wagner's Test)

To 1 ml of test solution few drops of Wagner's reagent was added. The formation of yellow precipitate indicates the presence of alkaloids.

4.4 Test for Phenols (Lead Acetate Test)

1 ml of extract was mixed with 3 ml of distilled water. To this mixture, 3 ml of 10% lead acetate solution was added. Formation of milky white precipitate indicates the presence of phenols.

4.5 Test for Tannins (Ferric Chloride Test)

A few drops of 0.1% of ferric chloride was added to the 1 ml of test solution. The presence was indicated by brownish green or a blue colour.

4.6 Test for Flavonoids (Alkaline Test)

To 2 ml of test solution, 2 ml of 10% NaOH was added. Intense yellow colour was formed which disappears on addition of dilute HCl. This shows the presence of flavonoids.

4.7 Test for Terpenoids (Salwokski Test)

2 ml of chloroform was added to the 3 ml of test solution and then 3 ml of con. H_2SO_4 was added. A reddish brown colour in interphase indicates the presence of terpenoids.

4.8 Test for Steroids (Salwokski Test)

To 3 ml of test sample, 1 ml of chloroform and equal volume of H_2So_4 was added to the side of the tube. The upper layer turns red and lower layer turns yellow with green fluorescence which indicates the presence of steroids.

4.9 Test for Saponins (Foam Test)

Add 2 ml of water to the test solution and shake well. Stable foam for 10-15 minutes indicates the positive result for saponin.

4.10 Test For Glycosides (Acetic Acid Test)

Glacial acetic acid and ferric chloride was added as drop to the test solution to that conc.H_2S0_4 was added. A reddish brown colour for the indication of positive result.

5. Results

5.1 Preliminary Phytochemical Analysis

The methanol and aqueous extracts of *Elytraria acaulis* was subjected to qualitative preliminary phytochemicals with different chemical reagents. The results are tabulated in (Table 1). The "+" symbol denotes the presence and "-" symbol denotes the absence of phytochemicals. Carbohydrates, protein, alkaloids, tannins, glycosides, terpenoids, phenols, flavanoids, steroids and saponins were found commonly in the tested plant extracts. In aqueous extract saponins, steroids, alkaloids and carbohydrates were totally absent.

Table 1. Qualitative Phytochemical screening of *Elytraria acaulis* L

S. No.	Name of the Phytoconstituents	Name of the Extract	
		Methanol Extract	Aqueous Extract
1.	Carbohydrates	+	_
2.	Proteins	+	+
3.	Alkaloids	+	_
4.	Phenol	+	+
5.	Tannins	+	+
6.	Flavonoids	+	+
7.	Terpenoids	+	+
8.	Steroids	+	_
9.	Saponin	+	_
10.	Glycosides	+	+

+ : presence of phytoconstituent; - : absence of phytoconstituent

6. Discussion

Although the presence of secondary metabolites and it's active compounds can be determined both qualitatively and quantitatively by using different tests, therapeutic values of medicinal plants could differ depending on soil condition, nutritional status, climatic condition, seasonal and diurnal variations. In this present study, the medicinal plant *Elytaria acaulis* leaf was screened to detect the bioactive compounds. Presence of secondary metabolites suggests that the plants might be medicinal importance and that can establish a scientific base for pharmaceutical industries in future.

In the present study, methanolic extract of *Elytraria acaulis* revealed the presence of alkaloids, tannins, flavonoids, glycosides, protein, saponins, steroids and carbohydrates this results were accordance with an earlier investigations (Sathish Babu *et al.,* 2015, Suthama Raj, 2019). Similar results were reported by Sundar *et al.,* (2015) through the phytochemical analysis in *Elytraria acaulis* in various extracts (petroleum ether, chloroform, benzene, methanol and water showed the presence of phyto constituents like teroids, erpenoids, carbohydrates, saponins, tannins and absence of anthroquinone in the extracts. This is in accordance with the present investigation.

Jagadeesan *et al.,* (2014) reported that the methanolic extract of the plant *Elytraria acaulis* has secondary metabolites such as tannins, flavonoids, glycosides, protein, carbohydrates and phenols and these results were coincidence with the present study. Phenolic compounds were found both in methanol and aqueous extracts. The phenolic compounds are one of the largest and most ubiquitous groups of plant metabolites. Phenolic compounds from plants have potent antioxidant properties and its use in the prevention of various oxidative stress associated diseases such as cancer is widely reported (Dai *et al.,* 2010). Phenolic compounds play a major role in scavenging the free radicals allow them to act as antioxidants, which thrusts the use of total phenolic concentration as a measure for rapid screening of antioxidant activity (Soobrattee *et al.,* 2005).

Flavonoids were found in methanol and aqueous extracts. Flavonoids are potent water soluble antioxidant which prevent oxidative cell damage and supports the cell system to resist cell damage under stress caused by various diseased conditions (Panchae *et al.,* 2016). Similarly prominent presence of tannins was found only in methanol. Remarkable medicinal properties of tannins making it a natural component for severe conditions is of high value (Ashok, 2012). Steroid was detected only in ethanol extract. Presence of Saponins showed its prominent role as a phytoconstituent and reports of its role as anti-inflamatory agent is widely reported (Wang *et al.,* 2010) (Just *et al.,* 1998).

Alkaloids were detected in methanol extracts alone. Hence, methanolic and aqueous extracts of *Elytraria acaulis* roots showed the presence of the various phytoconstituents (Sundar *et al.,* 2015). The evaluated compounds phenols, flavonoids, tannins and terpenoids possess antioxidant properties and high anti-microbial activity and this pertains to earlier studies (Simmi Singh *et al.,* 2021).

7. Conclusion

Phytochemical studies of *the Elytraria acaulis* plant leaf revealed the presence of carbohydrates, protein, alkaloids, tannins, glycosides, terpenoids, phenols, flavanoids, steroids and saponins in methanolic extracts which proved to be an efficient solvent for extraction. From the results of phytochemical observations it has been proved that this plant can be used for development of herbal drugs proving the high medicinal value of the plant. Further studies can be done either on isolation of new compounds and analyze their biological properties.

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