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Research Article

Phytochemical Screening for Active Compounds in Gloriosa Superba Leaves And Tubers

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ABSTRACT

Gloriosa superba Linn. (Family: Liliaceae) is one of the endangered species among the medicinal plants which is a striking tuberous climbing plant with brilliant wavy-edged yellow and red flowers common in forest throughout India and in Andaman Islands. The objective of this study was to evaluate the phytoconstituents of *Gloriosa superba* leaf and tuber extracts. All experiments were conducted following standard procedures. The results revealed the presence of various classes of compounds such as alkaloids, flavonoids, saponins, glycosides, steroids, phenols and tannins. Resins was not detected from any of the extract under study. The results of the various phytochemical tests indicated that the plant to be rich in various biologically active compounds which could serve as potential source of the crude drugs that can be used as a complementary source of traditional medicines. We recommend further research on this plant for possible isolation and characterization of the various chemical active substances.

Keywords: *Gloriosa superba*, endangered, phytoconstituents, standard procedures and characterization.

INTRODUCTION

Medicinal plants have been used as sources of medicine in virtually all cultures [1,2]. In recent years, there has been a gradual revival of interest in the use of medicinal plans in developing countries because herbal medicines have been reported safe and without any adverse side effect especially when compared with synthetic drugs. Thus a search for new drugs with better and cheaper substitutes from plant origin is a natural choice. The medicinal values of these plants lie in some chemical substances that produce a definite physiological action on human body [3].

Gloriosa superba Linn. of family Liliaceae, is one of the endangered species among the medicinal plants [4] which is a striking tuberous climbing plant with brilliant wavy-edged yellow and red flowers that appears from November to March every year [5]. Herbaceous tendril climber; root stock tuberous, naked, stem sparingly branched; leaves sessile or nearly so, flowers axillary, solitary, at first greenish, becoming yellow and finally red.

The tuberous root stocks of glory lily, boiled with Sesamum oil is applied twice a day on the joints, affected with arthritis reduces pain [6]. Seeds are used for relieving rheumatic pain and as a muscle relaxant [7]. The tuber is useful in itching, skin diseases including wounds and ailments caused by vitiated kapha and vata, can be administered to a delivered mother along with spirituous drink to give relieve to her postnatal complaints. It is pungent, thermogenic, and used as a purgative. In the world market, the tubers are considered as rich sources of colchicines and gloriosine [8,9]. Roots are acrid, anthelmintic, antipyretic, bitter, digestive, expectorant, highly poisonous and promoting expulsion of the placenta. Root paste is effective against paralysis, rheumatism, snake bite and insect bites.

Glory lily (*Gloriosa superba* L.) also known as Creeping lily or Flame lily, is a native of tropical Africa and is found growing naturally in many countries of tropical Asia including Bangladesh, India, Sri Lanka, Malaysia and Myanmar. It is one of the major medicinal plants in India cultivated for its seeds which are exported to developed countries for pharmaceutical use. However, not much is known about the chemical composition of the plant leaves and tubers [10].

The aim of this study was to determine the phytochemical properties of *Gloriosa superba* leaves and tubers with the aim of further isolation and characterization and the possible use of these substances in industries and medicinal science.

MATERIALS AND METHODS

Plant materials: *Gloriosa superba* leaves and tubers were collected from Athur, Salem district, Tamilnadu, India and identified by Dr. V. Balasubramaniam, Associate Professor in Botany, Kongunadu Arts and Science College, Coimbatore and has been deposited in the Herbaria of Kongunadu Arts and Science College, Coimbatore, Tamilnadu, India.

Preparation of plant extract: The acetone, chloroform, dichloromethane and methanol extracts of the leaves and tubers of the plant were prepared according to standard

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Table 1. Preliminary phytochemical tests for the presence of active constituents in *Gloriosa superba* leaves

S.No	Compounds	Solvents used			
		Acetone	Chloroform	Dichloro methane	Methanol
1.	Alkaloids	-	-	-	-
2.	Flavonoids	+	+	+	+++
3.	Saponins	-	-	-	-
4.	Phenols	+++	++	++	+++
5.	Steroids	+	+	+	++
6.	Glycosides	+++	+++	+++	+++
7.	Tannins	+++	+	+	+++
8.	Resins	-	-	-	-

methods [11]. The plant parts such as leaves and tubers were collected and shade dried for about two weeks and ground into coarse powder. About 50 g powder of each plant part was separately extracted with 125 ml of acetone using soxhlet apparatus. The same powders were also extracted with chloroform, dichloromethane and methanol. The extracts were concentrated to dryness to yield crude residue. These residues were used for preliminary phytochemical screening of secondary metabolites.

Phytochemical screening: The leaves and tubers extract of *Gloriosa superba* were analyzed for the presence of alkaloids, flavonoids, saponins, glycosides, steroids, phenols, tannins and resins according to standard methods [11].

Screening for Alkaloids:Meyer's reagent (potassium mercuric iodide) 1.36 gm of mercuric chloride was dissolved in 60 ml of distilled water and 5 gm of potassium iodide was dissolved in 10 ml of water. These two solutions were mixed and diluted to 100 ml with distilled water. To 1 ml of the extract, a few drops of reagent were added. Formation of white or pale precipitate showed the presence of alkaloids.

Screening for Flavonoids: In a test tube containing 0.5 ml of extract, 5 to 10 drops of diluted HCl and small piece of ZnCl or magnesium were added and the solution was boiled for few minutes. The appearance of reddish pink or dirty brown colour indicates the presence of flavonoids.

Screening for Saponins: In a test tube containing about 5 ml of the extract, few drops of sodium bicarbonate was added. The mixture was shaken vigorously and kept for 3 minutes. A honeycomb like froth was formed and it showed the presence of saponins.

Screening for Glycosides: A small amount of extract was dissolved in 1 ml of water and aqueous sodium hydroxide solution was added. Formation of yellow colour indicates the presence of glycosides.

Screening for Steroids: To 2.0 ml of extract, 1.0 ml of concentrated sulphuric acid was added carefully along the sides of the test tube. A red colour produced in the chloroform layer shows the presence of steroids.

Screening for Phenols: Ferric chloride test: To 1 ml of the extract 3 ml of distilled water followed by few drops of 10% aqueous Ferric chloride solution was added. Formation of blue or green colour indicates the presence of phenols

Screening for Tannins: Lead acetate test: In a test tube containing about 5 ml of the extract, a few drops of 1 % solution of lead acetate was added. A yellow or red precipitate indicates the presence of tannins.

Screening for Resins: To 2.0 ml of extract 5 ml of acetic anhydride was added, dissolved by gently heating, cooling and then 0.5 ml of sulphuric acid was added. Bright purple colour indicates the presence of resins.

RESULTS

The results of preliminary phytochemical screening of acetone, chloroform, dichloromethane and methanol leaf and tuber extracts of *Gloriosa superba* are presented in Table 1 and 2. All the leaves and tuber extracts showed abundant occurrence of phenols, tannins and glycosides. Alkaloids were found to be present in higher concentration in all the extracts of the tubers but absent in the leaves extracts. Flavonoids and steroids were found in a moderate concentration in all the extracts of leaves and tubers. Saponins were found in moderate concentration in chloroform, dichloromethane, methanol tuber extracts but showed the absence in the acetone extract of tubers and all the extracts of leaves. Resins were absent in all the extracts of the two plant portions namely the leaves and tubers.

DISCUSSION

The interest in the study of medicinal plants as a source of pharmacologically active compounds has increased worldwide [12]. In most developing countries of the world, plants are the main medicinal sources used in treating infectious diseases [13].

The various phytochemical compounds detected are known to exhibit medicinal activity as well as physiological activity [13].

There are records that show the benefits of these compounds detected from *Gloriosa superba*. For example: Many of the earliest isolated pure compounds with biological activity were alkaloids. Naturally occurring alkaloids are nitrogenous compounds that constitute the basic active principles of flowering plants. Alkaloids are formed as metabolic by-products and have been reported to be responsible for the antibacterial activity [14]. Phenolics are the largest group of and have

Table 2. Preliminary phytochemical tests for the presence of active constituents in *Gloriosa superba* tubers

S.No	Compounds	Solvents used			
		Acetone	Chloroform	Dichloro Methane	Methanol
1.	Alkaloids	+++	+++	+++	+++
2.	Flavonoids	++	+	+	++
3.	Saponins	-	++	+	+++
4.	Phenols	+++	+	++	+++
5.	Steroids	++	++	+	++
6.	Glycosides	+++	+++	+++	+++
7.	Tannins	++	++	++	++
8.	Resins	-	-	-	-

been said to account for most of the antioxidant activity of plant extracts [15]. The trace quantities of phenolic compounds help to prevent the death of the crop, since phenolic compounds from plant extracts act as antimicrobial agent [16]. Phenolics and alkaloids detected in the extracts are compounds that have been documented to possess medicinal properties and health-promoting effects [17,18,19,20]. Glycosides are nonvolatile and lack fragrance. Glycosides serve as defense mechanisms against predation by many microorganisms, insects and herbivores [21].

Steroidal compounds are of importance and interest in pharmacy due to their relationship with such compounds as sex hormones [22]. Plant steroids are known to be important for their cardiotonic activities, they possess insecticidal and anti-microbial properties. They are routinely used in medicine because of their profound biological activities [23].

Saponins exhibit cytotoxic effect and growth inhibition against a variety of cell making them have anti-inflammatory and anticancer properties. They also show tumor inhibiting activity on animals [24]. Plant saponins help humans to fight fungal infections, combat microbes and viruses, boost the effectiveness of certain vaccines and knock out some kinds of tumor

cells, particularly lung and blood cancers [25]. These compounds served as natural antibiotics, which help the body to fight infections and microbial invasion [26].Tannins have been traditionally used for protection of inflamed surfaces of the mouth and treatment of catarrh, wounds, hemorrhoids and diarrhea [27]. Plant tannins have been recognized for their pharmacological properties and are known to make trees and shrubs [28].

Flavonoids are widely distributed group of polyphenolic compounds, characterized by a common benzopyrene ring structure. The biological functions of flavonoids apart from its antioxidant properties include protection against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatoxins, viruses and tumors [29]. Flavonoids reduced cancers by interfering with the enzymes that produce estrogen [29], [30].

CONCLUSION

In view of all these various uses associated with these compounds found in *Gloriosa superba* leaves and tubers extracts, we recommend further research on this plant to quantify the concentration of these compounds per known amount for industrial use. We believe these compounds in *Gloriosa superba* leaves and tubers could be harnessed for industrial and medicinal sciences utilization.

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