Review Article

Gloriosa superba (L.): A Brief Review of its Phytochemical Properties and Pharmacology

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Available Online: 21st November, 2015

ABSTRACT

Gloriosa superba (L.) is a perennial creeper in the Liliaceae family and is native to Africa and South-East Asia. G. superba is a national flower of Zimbabwe, and jointly it is the state flower of Tamil Nadu state in India. It is widely used as a medicinal plant, and it has two toxic alkaloids namely, Colchicines and Gloriosine are used in the treatment of gout and rheumatism. Similar to many poisonous plants, it has a long history of use in folk medicine and along with several related genera that contain colchicine it has been used to treat. Whole plant of G. superba keeps several biological activities such as antioxidant, antibacterial, antimicrobial, and anthelmintic properties. Furthermore, G. superba is a good abortifacient and causing expulsion of fetus from the womb. Therefore, based on the aforementioned consideration, this article reviews the most updated information of the phytochemical properties and pharmacological effects of G. superba extract, including its miscellaneous uses.

Keywords: Gloriosa superba, phytochemistry, antioxidant, anthelmintic, antimicrobial activity.

INTRODUCTION

Medicinal plants have been a rich source of biologically active compounds and play an important role in drug discovery. Different parts such as leaf, root, stem, fruit, seed, and park are used to obtain several phytochemical constituents. Medicinal plants are rich in flavonoids and every group of flavonoids has a capacity to act as antioxidants. Among them, flavones and catechin components act as the most powerful flavonoids for protecting the body against ROS. The other flavonoid components such as quercetin, kaempferol, myricetin and rutin have antioxidant, antiinflammatory, antiviral and antiallergic, as well as anticancer activities. Among Indian ayurvedic herbs, a number of thirty herbs have shown antitumor activities. Currently, natural product researchers have sharper eye on herbal products to obtain medicinally important bioactive compounds. Gloriosa superba is often referred to as Malabar glory, and it is a perennial creeper within the Liliaceae family, native to Africa continent and South-East Asia. Glory lily is that the national flower of Zimbabwe, and jointly it is the state flower of Tamil Nadu province in India. Its stem is thin and grows at the rate of twenty feet once a year. Leaves are ovate in shape concerning 6-8 inches long thread like at the apex that helps to climb on the trees. G. superba is one of the endangered species among the medicinal plants and this plant has two toxic alkaloids of colchicine and gloriosine. Colchicine is sometimes used in cytological and plant breeding research for chromosome doubling. Paste of the G. superba tuber is externally applied for parasitic skin diseases and also, this plant was used as associate ayurvedic medicinal herb to cure diseases like inflammatory disease, gout, ulcers, and hemorrhage. It has also been used to commit murder, suicide, and to induce abortions due to presence of colchicine. African porcupines and some moles are reputed to be able to consume the roots with no ill effect. G. superba is a good abortifacient and causing expulsion of fetus from the womb. Roots possess purgative, cholagogue, anthelmintic, bitter, acrid, astringent and germicidal properties. Paste is an antidote of snakebite and extract of plant also possess Central Nervous System (CNS) depressant properties. The tuberous root of G. superba boiled with sesamum oil is applied twice a day on the joints, affected with arthritis reduces pain. G. superba is also used in wounds, skin related problems, fever, piles, inflammation, uterine contractions, blood disorders, general body toner and poisoning. Based on the abovementioned comments, it is not surprising that the pharmacological benefits of Gloriosa superba have been attracting great interest. Therefore, the present review has been detailed updates of the phytochemical and pharmacological properties of Gloriosa superba as well as its miscellaneous uses.

Phytochemical properties

G. superba tubers contain colchicines, benzoic and salicylic acid, sterols and resinous substances like as colchicines, 3-demethyl colchicine, 1,2-didemethyl colchicine, 2,3-didemethyl colchicine, N-formyl, N-deacetyl colchicines, colchicocide, gloriosine, tannins and superbine. Colchicine is the major compound isolated from the seed and rhizome of this plant and other important compound is gloriosine. In addition, G. superba tubers hold 0.25% colchicine apart from containing sitosterol, glucoside, β-and gamma...
lumicolichicines, β-sitosterol, flucoside and 2-H-6-MeO benzoic acid and flowers contain luteolin and N-formyldene-Me-Colchicine20. 21 reported that new colchicine glycoside, 3-0-demethyl colchicine 3-O-alpha-D- glucopyranoside found in G. superba seeds.

Polyphenols

Phytochemical analysis of G. superba tubers and seed contain total phenolic concentration is 0.975 mg/g and 0.561 mg/g respectively. Total carotenoids concentration was presented in 22.74 mg/100g for tubers and 25.62 mg/100g for seeds. In addition, total ascorbic acid concentration 21.06 mg / 100g and 23.34 mg/ 100g for tubers and seeds respectively, reported by22. 23 Oberserved that G. superba seed have the presence of carbohydrates, alkaloids, glycosides, flavonoids, steroids, phenolics and terpenoids. Additionally, G. superba leaves exhibited the presence of carbohydrates, alkaloids, flavonoids, steroids and terpenoids. G. superba tuber exhibited the presence of carbohydrates, alkaloids and flavonoids, vitamin C, vitamin E, phenols, glycosides, saponins and minerals23-25. 26 observed that G. superba leaves and tubers exhibited various classes of compounds such as alkaloids, flavonoids, glycosides, saponins, steroids, phenols and tannins. Additionally, those suggested that G. superba plant are rich in several biologically active compounds which could serve as potential source of the crude drugs that can be used as a complementary source of traditional medicines.

Pharmacological activities

The different parts of G. superba exhibited diverse pharmacological activities and it was summarized in Table 1.

Antimicrobial activity

The phytochemicals from tubers of G. superba have with antimicrobial activity of showed a higher activity against the gram negative bacteria, Escherichia coli,27. 28 reported anti-microbial potential of G. superba extracts in which excellent antifungal activity was confirmed against Candida albicans, C. glabrante, Trichophyton longiJusus, Microsporum canis and Staphylococcus aureus. Antimicrobial activity of acetone, ethanol, methanol and hexane extracts of root and stem from G. superba was evaluated and reported that it showed that all the extracts posses antimicrobial activity against E. coli, S. aureus, A. niger and A. flavus. However, the acetone extract of the plant showed the highest antifungal activity against E.coli29. A significant antimicrobial activity was observed against gram negative bacteria than gram positive bacteria and C. albicans a fungal strain was reported in alcoholic extract of G. superba tubers33 .

Anthelmintic activity

15 reported that G. superba tubers alcoholic extracts showed good anthelmintic activity against earthworm Eisonia fatida. The ethanol and water extract of whole plant of G. superba were investigated for activity against Indian earthworms Phereutina posthuma. Both extract tested at the dose (20-60 mg mL⁻¹) level produced significant activity (p<0.01) when compared with piperazine citrate (15 mg mL⁻¹) and both extract exhibited considerable anthelmintic activity was reported by13.

Antioxidant activity

Methanolic extract of G. superba leaf showed significant antioxidant and antibacterial activity, and in additional, it can be exploited as a natural source of antioxidant and antimicrobial was suggested30. 31 reported that methanolic extract of seeds, tubers and leaves of G. superba showed antioxidant activity (Table 1).

Other benefits

Alcoholic extracts of G. superba showed 90% protection to mice treated with minimum leather dose of venom (LD₉₀) was observed32. Those researchers are reported that G. superba (25-100mg/mL) produced significant changes of membrane stabilization of human red blood cells exposed to hyposaline induced haemolysis. 33. reported that G. superba leaves extracts exhibited anticoagulant properties by inhibiting thrombin induced clotting, with IC50 value of 2.97 mg/mL.

CONCLUSION

Medicinal plants are natural sources of bioactive compounds to treat life threatening diseases. G. superba is an important medicinal plant, used as an antidote for snake...
poison, is in demand commercially. The tuber is poisonous, when consumed in high quantities. This plant also considered as colchicine sources for the chemical constituents of medicine industry. Additionally, it would be useful of producing high amount of colchicines for pest control based on natural products. Several studies were reported that G. superba 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.

REFERENCES