



Phytochemical and Pharmacological Studies on *Euphorbia pulcherrima*: A Review

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Abstract

Euphorbiaceae, often known as the "Euphorbias or spurge family," constitutes a large family of 300 genera and 5000 species; spread widely around the world. The genus is particularly known for its secretion of secondary metabolites. Phytochemical investigation showed the presence of water-soluble ash (2.5%), methanol soluble ash (0.13%), acid insoluble ash (2.2%) besides total ash value (3 %); illustrating the presence of 3% carbonate, phosphate, and silicates of sodium, calcium, phosphates, and magnesium on the incineration of *E. pulcherrima*. The leaves extract showed potential antimicrobial capacity at 10 mg/100 μ L and 20 mg/100 μ L. *E. pulcherrima* possesses characteristic antimicrobial, antioxidant efficacy, and anti-convulsant effect because of its phytochemical content. The presence of patuletin, flavonoids, and spinacetin further imparts anti-inflammatory tendency as evidenced by the decrease in edema in rats' feet, analgesic and sedative effects.

KEYWORDS

Euphorbeaceae, *E. pulcherrima*, Phytochemistry, Pharmacology

1.0 INTRODUCTION

The Anthophyta's Euphorbiaceae, often known as the "Euphorbias or spurge family," is a sizable blooming family with more than 300 genera and 5000 species that are widely distributed around the world. This family's members contain a lot of secondary metabolites. The largest member of this family is the genus *Euphorbia*, which is revered as a kingdom of medicinal plants in a few Asian nations including Pakistan and India. Additionally, the species of the genus *Euphorbia* are used in traditional medicine to treat a variety of diseases. Some members of this family are poisonous, while others

are useful for making milk bushes, spurges, and ornamental plants like the poinsettia (*E. pulcherrima*), and crowns of thrones. But latex, a rich source of secondary metabolites, is present in all of these species [1].

Poinsettia, Christmas star, or Christmas flower, *E. pulcherrima*, grows throughout the Pacific coast of North America and is also found in southern Mexico and Guatemala. Additionally, it can be found in numerous Asian nations as well as Nepal, primarily in the mountainous regions [2, 3]. Various parts of *E. pulcherrima* are utilized in the folk system for the curing of ailments such as normal/slow transit constipation, skin disease, and the rise of milk secretion

in nursing mothers. Also, *E. pulcherrima* has been documented for various in vitro and in vivo biological activities

[4]. Some species of Euphorbiaceae have been reported for many biological potentials such as central nervous system, fever, inflammation, neuropharmacological, and hypnotic purposes [5]. Flavonoids extracted from *E. pulcherrima* have been reported to possess moulting properties with *Spodoptera littoralis* [6]. Flavonoids documented from other plants have been reported for anti-inflammation, analgesic, phosphodiesterase, and anti-diarrheal activities [7–9].

The milky latex secreted by this species is corrosive, and poisonous, and are either annual or perennial herbs, woody shrubs, or trees [10]. The roots might be thin, thick, tuberous, or fleshy. Many species are rather thorny, succulent, or defenseless. Succulent species have thick, fleshy main stems that range in height from 15 to 91 cm (6 to 36 inches) and frequently have side arms. The deciduous leaves can be in whorls, alternating, or opposite arrangement. The majority of the leaves in succulent species are tiny and transient. Mostly small, partially changed into spines or glands, or absent, the stipules are modest in most cases [1]. All flowers in the Euphorbiaceae family are unisexual and frequently rather tiny. The blossoms in Euphorbia are further reduced before aggregating into an inflorescence or flower cluster called a "cyathium" (plural cyathia). Nowhere else in the plant kingdom is this trait present in all species of the genus. Most other major plant genera differ in the characteristics of the blooms, but Euphorbia differs in the characteristics of the cyathium, which can exhibit astounding variations in different groups within the genus [9].

The aerial parts of *E. pulcherrima* have long been used in folk medicine to treat a range of ailments, such as common and slow-moving constipation, and skin diseases, and to increase milk production in nursing mothers. However, several members of the genus Euphorbia have advantageous properties such as anti-inflammatory, anti-pyretic, considerable relaxing effects, and anti-depressant properties [11]. According to a number of pharmacological studies [12], the family Euphorbiaceae can also be used as

an analgesic, antipyretic, anti-inflammatory, anti-convulsant, hypnotic, and neuroleptic, among other things, to treat the central nervous system.

2.0 MATERIALS AND METHODS

The pharmacological properties and active ingredients of *E. pulcherrima* have been extensively studied, and this plant offers a lot of potential for use in contemporary medicine. The current study involved the phyto, physicochemical standardization of dried, matured root of *E. pulcherrima*. The study estimates physicochemical parameters such as extractability in water and methanol, loss on drying, and ash levels in addition to organoleptic characteristics. Antibacterial assays and preliminary phytochemical screening have been carried out.

3.0 RESULTS AND DISCUSSION

The phytochemical analysis of *E. pulcherrima* has been documented previously which indicated the presence of a bioactive class of secondary metabolites such as terpenoids, steroids, tannins fatty acids etc. The less polar compounds were identified in hexane extract while the polar ones were found in methanol and ethanol extract. [13].

3.1 Pharmacognostical evaluation of *E. pulcherrima*

Pharmacognostical evaluation of *E. pulcherrima* showed the presence of water-soluble ash (2.5%), methanol soluble ash (0.13%), acid insoluble ash (2.2%) besides total ash value (3%); illustrating the presence of 3% carbonate, phosphate and silicates of sodium, calcium, phosphates, and magnesium on incineration of *E. pulcherrima*. Likewise, phytochemical analysis was performed using standard protocols to confirm the availability of phytoconstituents. *E. pulcherrima* showed positive results for alkaloids on testing by Dragendorff's test, Mayer's test, and Hager's test. The alkaline reagent test and Ferric chloride test gave positive results for flavonoids. Saponins were found present via the Foam test and Froth test. The Ferric Chloride test gave a positive result for tannins. Whereas phenols, carbohydrates, cellulose, glycosides, steroids, and proteins gave negative results; demonstrating their absence in *E. pulcherrima* root powder. So the presence of certain phytochemicals led to the detection

of probable antibacterial activity of *E. pulcherrima* roots. Results exhibited the highest antibacterial activity against gram-positive bacteria in dose dependent manner by its ethanolic plant extract [13].

3.2 Anti-microbial Efficacy of *E. pulcherrima*

Pharmacological investigation *E. pulcherrima* leaves extract showed potential antimicrobial capacity at concentrations of 10 mg/100 µL and *S. aureus* bacterial inhibition at 20 mg/100 µL [14]. This potential is believed to be due to phenolic compounds in leaves. Similarly, research conducted by Jannah & Muhimmatin [15] stated antimicrobial effect on *S. typhi* upon administration of *E. pulcherrima*; with average diameter of the inhibition zone of 1.1 mm (MIC 5%). Moreover, *E. pulcherrima* antioxidant efficacy was monitored using the DPPH method and yellow spots on the TLC; suggested its antioxidant potency. Further investigation revealed that this antioxidant effect is the indicator of flavonoids, terpenoids and tannins presence [16]. Moreover, an anticonvulsant effect was observed without any effect on the coordination of motor nerve cells and anxiety [17]. Also, the availability of patuletin, flavonoids and spinacetin imparts anti-inflammatory tendency as evidenced by the decrease in oedema in rats' feet. Furthermore, analgesic and sedative effects also impart muscle relaxant effects [18].

4.0 CONCLUSION

This literature highlights the physiochemical and pharmacological impetus of *E. pulcherrima*. Most dominant activities being anti-microbial and antioxidant. Other than these, *E. pulcherrima* is known for its antihistamine, diuretic, antithrombotic, analgesic, anti-hypercholesterolemia, anti-pyretic and anti-hyperglycemic effects. However, further research would help in exploring more pharmacological effects of *E. pulcherrima*.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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