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Review Article

A review on physicochemical properties and pharmacological activity present in *Erythrina variegata* plant leaves

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ABSTRACT

The morphology, pharmacological activity, and phytochemical screening of *Erythrina variegata* are the briefly outline in the study. A substitute term for *E. variegata* is also known as *Erythrina indica*. The plant is capable of reaching an average height of between fifty and sixty feet. Many phytoconstituents, which includes alkaloid substance, tannins, flavonoids, and other resin, protein, saponins and glycosides, have been identified. Terpenoids, triterpenoids, steroids, and phenols are a few examples of secondary metabolites. According to Soxhlet techniques, there are five unique solvent system: methanol, hexane, ethyl acetate, dichloromethane, chloroform, and aqueous solution. Various parts of this plant have been used in traditional medicinal for their analgesic, nervine-calming, antiseptic, antacid antiepileptic, anti-asthmatic, and anti-inflammatory properties. *E. variegata* plant parts of leaves are used to treat infections produced by bacteria that inhibit or eradicate *Pseudomonas* and *Escherichia* (*E. coli*) bacteria. Its further block both grammeme-positive and grammeme- negative bacteria. *E. variegata* leaf bark is the main treatment for various diseases in medical systems like siddha (Ayurveda), Unani medicine, and Homoeopathy.

Keywords: Physicochemical properties, Phytoconstituents, Pharmacological activity in *Erythrina variegata* leaves

INTRODUCTION

The *Erythrina variegate* is a member of the family *Fabaceae*. *E. variegate* plants contain more than 110 species, where collection is referred as coral trees. The coral trees are grown primary their aesthetic value, and shade are help to improve the ability for nitrogen in soil fixation for other tree crops are similarly to the coffee and coco.[1]

The *E. variegate* leaves are medium sized annual tree and Erythrina has a triangular leaf and it is very difficult to arises and limbs, and immense or gigantic coral red blooms. This plant may be discovered throughout Asia, however it continuous to expand almost exclusively in Bangladesh. It is well known for its medical fields and many people used as a treatment for tropical and subtropical countries. This fascinating plant grows quickly due to it's a range of color's leaves and lovely red flowers. This rapidly growing plants has 6 inch green and yellow leaves and grows to between 60-80 feet. This tree has 2.5-inch crimson spring emerges in dense 6-inch clusters. The seeds of 12-inch-long and dark brown or brownish-red seeds pods containing nephrotoxic seeds.[2,3]

The erythrina, which derived from the Greek word "Erythrose" which means "red". In India, the leaf juice is blended with Honey and consumed to treat roundworm, tapeworm, and threadworm. This juice is help with woman lactation and menstruation; And it is sometimes mixed with castor oil to treat dysentery, and a warm poultice made from the leaves is applied externally to relieve rheumatism.

The deciduous tree *E. variegate* is provided with dark colored prickles.

Leaves

The leaves of this species have been ovate-rhomboid, with petioles up to 13 cm long lanceolate stipules, acute at the tip, as well a leaflet up to 13×15 cm.

Flower

The dense clusters up to 22 cm long.

Calyx

Spathaceous, 2 cm long, with a very oblique mouth and an extremely tiny 5-toothed tip.

Fruit

There are 15 cm long, cylindrical pods that are shimmering and indehiscent.

Seeds

Six to eight seed pod like structures, 15-30 cm long massive dark red colored seeds.[4]

Distribution and habitat

It grows in area with 800-1500 nm of annual rainfall and is well suited for moist and dry environmental conditions as well as tropics and subtropics regions. It thrives in forests and hills, primarily located within warm areas with coastlines up to 1600 nm. The pharmacological and physicochemical analysis of the stem bark of Pari Bhadra (*E. variegate*) were conducted in this study using macroscopic and microscopic examination systematic extraction and chemical testing of the extract, ash analysis and chromatographic technique using TLC and HPTLC.[5]

It has 40 flavonoid compounds and more than 60 alkaloids have been successfully structurally identified and isolated from *E. variegate* and approximately 20 other structured compounds, 12 steroids, 6 benzofurans, 8 terpenoids and 17 pterocarpous have also been isolated and identified from this species. Some of these volatile substances emerged from leaves, but most of them were found and separated from the roots and bark. And the few compounds from the leaves, and published in the anti-depressant activity and anti-anxiolytic.[6,7]

PLANT INFORMATION

Before its leaves show in April, the coral tree is covered in the massive red blooms, and the each of the size is approximately two inches long and clustered in thick six-inch clumps.

These blooms are followed by 12 inch long, red/brown seed pods that contains poisonous seeds. This fast growing, 50-60 food wide.[8]

Taxonomy

Kingdom: Plantae-plants, subkingdom: Trophobiont-Vascular plants, division: Magnoliophyte (flowering plants), angiosperms, family: *Fabaceae,* Class: Magnoliopsida-Dicotyledons, subclass: Residue, Order: Fables, genus: *Erythrina* and *s*pecies: *Erythrina variegate.* L.[9]

Vernacular names

Tamil-Kaliyanamurukai, English-Indian coral tree, Hindi-Mandara, Telugu-Pandukampu, Kanada-Haaligamara, Marathi-Pangara and Samoon-mamalu.[10]

Common names

English: Indian Coral tree, Tiger's claw, Sunshine tree. Tamil: Marakkonrai, Hindi: Parijat, Malayalam: Murikka, Bucida: Philippines and Dadap name Indonesia.[12]

Geographical description

E. variegate plant is grows in the tropical and subtropical region of Asia, Australia, Pacific Islands. Most of the plant is obtain from the (South Asia) India, Sri Lanka, Bangladesh (South east) Indonesia, Thailand, Malaysia, Vietnam and Philippines. (East Asia) Southern China, Taiwan.

HABITAT

Erythrina grows in semi-arid, and subtropical areas, primarily with is 750-500 mm of annual rainfall per year.

This species usually grows up to elevation of 1500 meters. The plants are found inside the India, mostly in hills and forests.

Appearance

This compound of trifoliate alternating the rachides of *E. variegate* leaves can reaches range from 10-20 cm long. It can reach a height of 27 meters or 90 feet. The seeds are appearing as a red colour round seeds inside the pods. The bark may break off in papery flakes and in smooth, yellowish, or Gray-green colour

MORPHOLOGY

Flower

E. variegate D. looks like striking, bright red or orange flowers colour. This flower plant is coming under the *Fabaceae* (*Leguminosae*) family.[12,13]

Calyx (sepals) it is as 5 sepals and sometimes often fused. It has a bell-shaped flower, and colour are usually green size of the calyx is 1-1.8 cm (0.4-0.7) in length.

The papilionaceous corolla has a short clawed, ovate to subelliptic standard that is 3-4 cm (1.2-1.6) long.

The wings are roughly half as long standard and contain greenish to pale red, but the keel as the same in length as the wings. The keel encloses the superior ovary, which has ten amadelphous stamens, a total of nine od which are fused at the base. According to the statements flowers occurs in the southern hemisphere from July to December and in the northern hemisphere six month later.

Leaves

The leaves of *E. variegate* are deciduous ornamental and medicinal tree. This compound and trifoliate which meaning of three distinct leaflets arranged on a single petiole.

The terminal leaflet is one of the middles of broadly ovate the rhomboid in shape. The rachis is typically 10-20 cm (4-8) in long, and the blades are ovate to rhomboid, 8-18 cm (3.2-7.2) long. The lateral leaves are smaller than the terminal ones with petioles 6-13 mm long.

Extremely windy conditions coupled with below average temperature; erasures powdery mildew and drought will hasten leaf drop and delay the growth of new leaves.

Fruits

The fruit is a tightly packed, narrowly along pod that is 10-14 cm (4-5.6) in long sterile at the base, and uncastratable between the 5-10 dark brown seeds. The legume (pod) as a dry, elongated pod like fruit. The shape of the fruit is cylindrical or slightly curved and then often constricted between the seeds.

The immature fruit as a green in colour and mature fruit as a brown or blackish brown when there fully dry.

In the southern hemisphere, the fruits ripen between October and December while in the northern hemisphere.

Seeds

The seeds are oval along and kidney shaped and the size of the seeds are 1-2 cm in length. The *E. variegate* seed appears as a bright red, orange sometimes dark brown. In these seeds are absents of Erythrina seeds are non-endospermic. In this plant seeds each kilogramme contains 1450-5000 seeds.

PHYTOCHEMICAL SCREENING

Leaf extract

E. variegata leaf of phytoconstituents contains of alkaloids and glycosides in leaf extract and the most commonly used more concentration are chloroform, ethanol, methanol and butanol.

Majorly rare compounds like flavonoids and phenol were identified in the butanol extract which is similarly analysis of phytoconstituents are chloroform of *E. variegata* contain of alkaloids, flavonoids, glycosides, phenols, tannins, steroids, quinones and saponins.[15]

Table 1: Phytochemical screening.[14]

Parts of extract	Components	Methanol extract	Butanol extract	Chloroform extract	Ethanol extract	Aqueous extract
Leaf	Alkaloids	+	++	-	+	-
Leaf	Flavonoids	+	++	++	+	-
Leaf	Glycosides	+	++	+	+	+
Leaf	Phenols	+	-	+	+	+
Leaf	Tannins	+	+	+	+	+
Leaf	Steroids	-	+	+	+	+
Leaf	Quinones	-	-	+	-	-
Leaf	Saponins	+	-	-	-	+

METHODOLOGY USED

Collection of plant material, chemical and drug used and preparation of plant extraction methods were used.

Collection of plant material

Fresh leaves of *E. variegate* were collected from the local fields of Tamil Nadu. The plant specimen was identified and authenticated by siddha medicinal plant garden, Dharmapuri, Tamil Nadu. Leaves were separated from the adulterants, and shade dried.

Chemical and drug used were ethanol and chloroform.

Figure 1: Leaves of *E.variegate.*

EXRACTION OF CRUDE LEAF

The fresh leaves of *E. variegate*, were collected plant leaves were washed with distilled water, and must be shade dried.

Dried leaves are grained/ blended into a very fine powder.

Soxhlet extraction

The powdered leaves are packed into a thimble of placed in a Soxhlet apparatus.

And then fill the Soxhlet apparatus with the ethanol and methanol.

Heat the solution at 15 degrees Celsius to 25 degrees Celsius after adding the solvent the solvent is continuously recirculated and extraction the desired compounds.

The extraction process may take a few hours or 4 to 12 hrs depends on seired compounds and the specific compounds is extracted.

Types of extraction

Standard Soxhlet techniques and modified Soxhlet extraction techniques were used.

Standard Soxhlet extraction

The core of the Soxhlet method lies in the continuous extraction of a soluble components from a solid material using a solvent in a closed system, the solvent is heated and vaporized the condenses is above the solid phase and thimble the solvent after filter the sample by using the filter paper. This method is widely used in the polymer analysis.

PHARMACOLOGICAL ACTIVITY

Anti tumor

Strong bioactive components were found in the extracts of *E. coli*, according to antiproliferative, antitumor, pesticidal, and other bioactive agents, variegata may be very helpful. This study tested the lethality of different fractions of the methanolic extract of E. using Artemia salina. Varieties, such as water in brine shrimp, carbon tetrachloride, n-hexane, and chloroform. Although referenced to the LC_{50} values, the corresponding values for the carbon tetrachloride (CT), the chemical chloroform and aqueous fractions were 36.68, 4.67, 7.733, and 14.289 grams per millilitres, consequently, when compared to vincristine sulphate, the positive control, the methanolic extract's carbon.[16]

Antioxidant

In an effort to guard against adverse effects of destructive free radicals and other oxygen species that react, body of humanity possesses sophisticated antioxidant system called the antioxidant defence system. On the other hand, oxidative stress can be caused by an accumulation of an excessive quantity of radicals, which can be associated with a variety of circumstances lifestyle, and health issues. Precisely result of belief that antioxidants have potential to assist in elimination of oxidative stress, researchers are digging for natural compounds that possess substantial amounts of antioxidant activity while demonstrating minimal amounts of cytotoxicity.[17]

Anti-inflammatory

Erythrina variegate plants are isolated, alkaloids are extracted from the leaves and bark to treat the fever and rheumatisms. The leaves methanolic extract in the acetic acid that causes writing paradise stopped 48.06% of the writing response normal people dosage from uses as 550 milligrams per kilograms of body. According to the final result was considerably distinct different ($p<0.1$). the extract sample was increasing the tail flick by 27.03% in the hot radiating tail flick model at 550 mg\kg body weight. The Erythrina has been examined for its many ways of killing germs. The antimicrobial activity has been tested since it is very important for medicine. Infections have been on the rise in recent years, and resistance to antibiotics is becoming a bigger and bigger problem for doctors. Plant based antimicrobials have a lot of therapeutic potential since they can do the job without the adverse effects that synthetic antimicrobials sometimes have. Many plants in the erythrina genus have secondary metabolites that they make when they are stressed or when they are infected. Erythrina root extracts can kill Staphylococcus aureus and Mycobacterium smegmatis.[18]

Antibacterial activity

We tested iso-flavonoids taken from *Erythrina* (*E. variegata*) against methicillin-resistant *S. aureus* and a number of other strains to see if they had any antibacterial properties. Erycristagallin and orientanol B were the most effective in killing germs among the active substance. Erycristagallin killed mutans *Streptococci* bacteria, which is how I worked as an antibiotic. Erycristagallin could be a strong phytochemical that sops dental caries by stopping cariogenic bacteria from growing and interfering with the integration of glucose, which is needed to make organic acids. We looked at how well leaf, stem, and root butanolic extract (20 µg/ml, 40 µg/ml, 60 µg/ml, 80 µg/ml) and control streptomycin (10 µg/ml) killed bacteria. When compared to other concentrations, the butanolic leaf extract had the largest zone of inhibition at 80 µg/ml. The inhibitory zone likewise got bigger as the amount of plant extracts got bigger. At a dosage of 80 µg/ml, the most antibacterial activity was against *B. subtilis* and *E. coli*.[16,19]

CNS

The study found that the total alkaloid fraction from the bark had many pharmacological effects, including

neuromuscular blocking, CNS depression, and anticonvulsant effects. These results are in line with how the plant extracts are used in traditional medicine.[20,21]

DISCUSSION

E. variegata is a medicinal plant with a variety of uses, medicinal, cosmetics and fragrance. Traditional medicines of *E. variegata* are used in traditional medicinal system in India, Australia, Africa and it also take place in various islands in the Indian and pacific oceans, and also grows tropical and subtropical. It is a popular ornamental tree and is also valued in the various uses Argo forests and traditional medicinal uses.[22]

PHARMACOLOGICAL EFFECTS

E. variegata includes pharmacological effects neuromuscular blocking, smooth muscles relaxation, CNS depression and hydrocholeretic activity. Anti-inflammatory, antioxidant, and potential cardiovascular effects. The plants are also investigated for its anti-depressant, anti-osteoporotic and anti-microbial properties.[23]

CONCLUSION

E. variegata is a source of bio active compounds with potential therapeutic application. Further review is crucial to fully understand its pharmacological properties and translate its benefits into effective treatments for various diseases. The phytoconstituents are alkaloids, flavonoids, steroids, tannins, saponins extracted from this plant which is responsible for the pharmacological effects. The demonstrate the anti-convulsant, anti-bacterial, anti-microbial etc. *E. variegata* plant each part of the plants used for the treatment of varies of diseases in India. A totally 23 studies had been carried out in regard with the pharmacological activities exhibited by leaves of *E. variegata*.

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