



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203



Human Journals

Review Article

June 2022 Vol.:24, Issue:3

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A Brief Overview on *Erythrina variegata*



IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals



ISSN 2349-7203

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Submitted: 20 May 2022
Accepted: 25 May 2022
Published: 30 June 2022

Keywords: Ayurveda, Homeopathy, Siddha, Unani.

ABSTRACT

Erythrina variegata also called *Erythrina indica* is a thorny deciduous tree growing 60 feet tall. A wide range of chemical compounds has been isolated from it, mainly alkaloids, flavonoids, and triterpenoids. It has also been investigated for various pharmacological actions. The genus *Erythrina* (Leguminosae) which is distributed in the tropical and subtropical regions comprises approximately 110 species. Some of the species of this genus are a rich source of alkaloids and flavonoids, and certain species are used in traditional medicine for the treatment of several diseases. More than a thousand medicinal plants are recognized in our country. The present review is therefore an effort to give a detailed survey of the literature on the phytopharmacological properties of *Erythrina indica* belonging to the family Fabaceae, which is a shrub with prickly stems; it is a wild-growing forest plant in India. The majorly popular systems of medicine like Ayurveda, Siddha, Unani, and homeopathy. Various plant parts such as bark, root, fruits, and leaves are used in the treatment of fever, astringent, febrifuge, skin diseases, etc.



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INTRODUCTION:



Erythrina variegata has a very distribution in the tropics and has been introduced into a large number of countries through cultivation. *Erythrina variegata* is a multipurpose tree, often used in agroforestry systems. It can be lopped for fodder, as its foliage has a relatively high protein content that makes it an excellent feed for most livestock.

TAXONOMY

Kingdom: Plantae-plants

Division: Magnoliophyta -Flowering plants

Class: Magnoliopsida-Dicotyledons

Family: Fabaceae (legume family)

Subfamily: Papilionoideae

Genus: *Erythrina* L.-Coral Tree

Species: *Erythrina variegata* L.

MORPHOLOGY

Scientific name: *Erythrina variegata* var. *Orientalis*

Common name(s): Coral Tree

Family: Leguminosae

USDA hardiness zones: 10 through 11

Origin: not native to North America

Specimen: no proven urban tolerance

Availability: somewhat available, may have to go out of the region to find the tree

DESCRIPTION

Height: 50 to 60

Feet Spread: 40 to 50 feet

Crown uniformity: symmetrical canopy with a regular (or smooth) outline, and individuals have more or less identical crown forms

Crown shape: round; vase shape

Crown density: dense

Growth rate: fast **Texture:** coarse

FLOWERS



Inflorescence of many-flowered fascicles occurs in terminal or axillary racemes up to 20 cm (8 in) or longer. The calyx is top-shaped, deeply split along one side, 1–1.8 cm (0.4–0.7 in) long, on a pedicel 2–5 mm (0.1–0.2 in) long. Corolla is papilionaceous; the standard is short-

clawed, ovate to subelliptic, 3–4 cm (1.2– 1.6 in) long, red-orange with longitudinal white lines; wings are about half as long as the standard, greenish to pale red; keel is as long as the wings, greenish to pale red. The ovary is superior, stamens 10, diadelphous, with 9 fused at the base, enclosed within the keel. Flowering is reported from July to November in the Southern Hemisphere and 6 months later in the Northern Hemisphere.

LEAVES



Leaves are trifoliate, alternate; rachis is mostly 10–20 cm (4–8 in) long; blades are ovate to rhomboid, 8–18 cm (3.2–7.2 in) long; lateral ones are smaller than the terminal one, petiolules 6–13 mm long, with vegetative parts finely pubescent. They are deciduous just before and during the flowering season, except for “Tropic Coral”, which has been reported by some authors to not drop its leaves, while other sources have noted its deciduous habit. *E. variegata* retains its leaves better than other *Erythrina* species in Hawaii. Low temperatures, powdery mildew, and/or drought combined with very windy conditions will accelerate leaf drop and retard the development of new leaves.

FRUIT



Fruit is a compressed, narrowly oblong pod 10– 14 cm (4–5.6 in) long, sterile in the basal portion, and not constricted between the 5–10 dark brown seeds. The fruits are ripe from October to November in the Southern Hemisphere and March to April in the Northern Hemisphere, but they often remain on the tree for several months longer.

SEEDS



Seeds are kidney-shaped, dark purple to red, and 1–1.5 cm (0.4–0.6 in) in length. These simply fall to the ground and may be washed away (they have been seawater-dispersed over their native range). There are 1450–5000 seeds/kg.

Medicinal Importance of Erythrina variegata: The coral plant is a multi-use plant for humans as well as animals. It is used as Food: The new leaves are eaten in curries, as Fodder: Used as livestock fodder when lopped as it is rich in nitrogen (4% of dry weight), as Fiber: the bark is stringy and provides a strong fiber that is used in rope making.

Medicine:

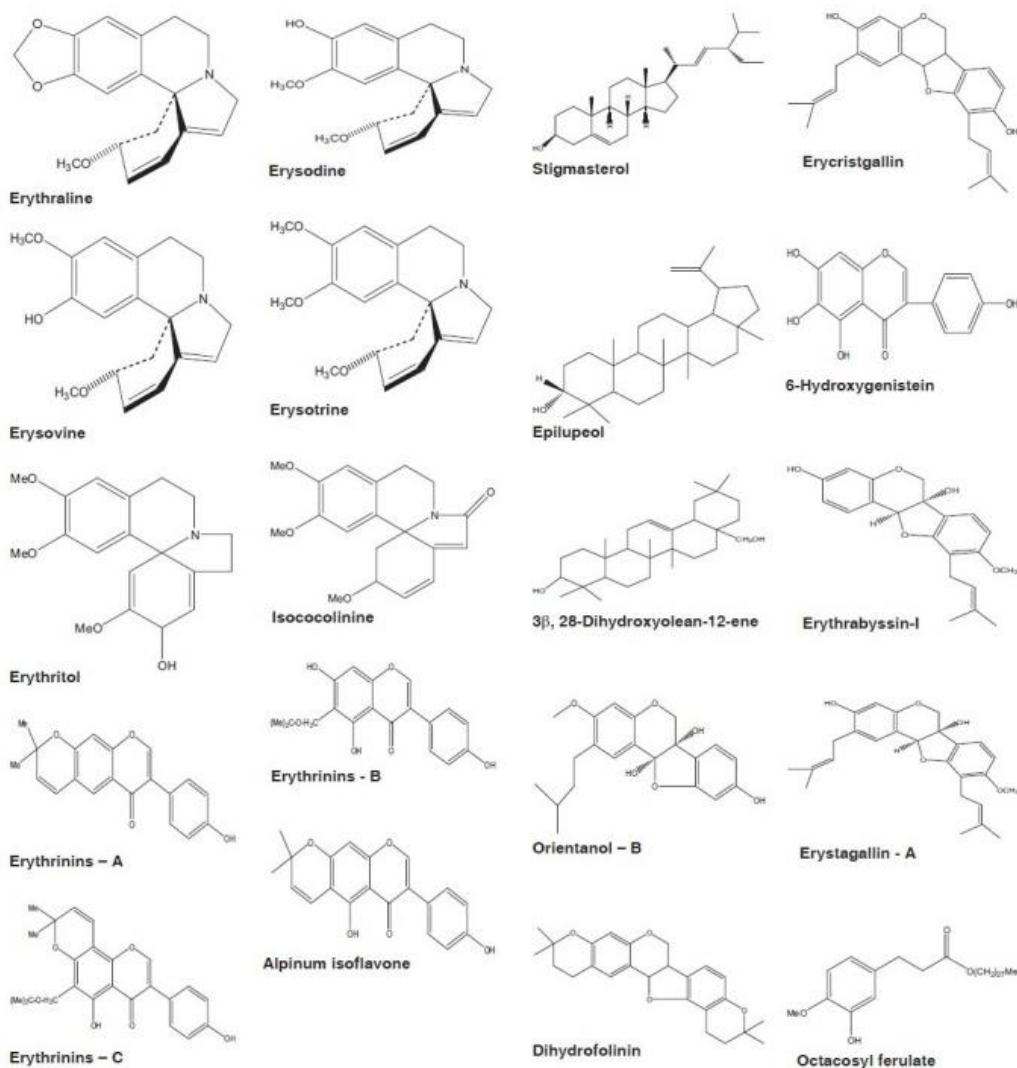
the bark and leaves are used in stomach disorders, anti-abortion treatment, malarial fever, and liver problems, as Timber: The wood is light, soft, does not split and neither warps, making it suitable in applications where heavy wood is unsuitable such as in small curved articles and Tannin and Dyestuffs: A red dye is extracted from its flowers and many more. The pharmaceutical aspect of Erythrina species includes Antibacterial/ Dental care prevention, Antioxidant, Analgesic & Anti-inflammatory, Cardiovascular effects, Smooth muscle relaxant, Anti-osteoporotic Effect, Trypsin/ Proteinase inhibitors, Cytotoxicity, Zinc & Cadmium removal from Pollution and Calcium Homeostasis.

Phytochemical Screening of *Erythrina variegata* leaf:

The study has been made to investigate the phytochemical screening of the *Erythrina variegata* leaves. Such a qualitative analysis is thus a part of preliminary standardization.

Phytochemical screening of aqueous leaf extract of *E. variegata* contained Glycosides, phenols, and tannins. Methanolic extract revealed the presence of flavonoids, glycosides, phenols, tannins, and resins. The ethanolic extract showed the presence of alkaloids, flavonoids, phenols, tannins, and resins. The qualitative phytochemical analysis indicates that hexane extract possesses flavonoids, glycosides, and saponins. From the phytochemical analysis, it was noted that all the extracts of *E. variegata* leaf are rich in various secondary metabolites such as phenolics, alkaloids, flavonoids, tannins, and saponins. Among the various solvents screened for phytochemicals, the ethanolic extract is very effective followed by methanol, chloroform, hexane, and aqueous extracts.

It has been mentioned that the antioxidant activity of plants might be due to their phenolic compounds and tannins. Flavonoids are most commonly known for their antioxidant activity. They are modifiers that modify the body's reactions to allergens, viruses, and carcinogens. They show anti-allergic, anti-inflammatory, antimicrobial, and anticancer activity. The presence of alkaloids explains its anti-bacterial activity since this phytochemical is reported to have antibacterial activity. Tannins are reported to have various physiological effects like anti-irritant, antisecretolytic, antiphlogistic, antimicrobial, and antiparasitic effects.



PHYTOCONSTITUENTS:

Alkaloids, flavonoids, pterocarpans, triterpenes, steroids, alkyl trans-ferulates, proteins, and lecithin are found in the genus. The bark contains certain resins, stable oils, fatty acids, and alkaloids like erisodin, a prinsonin, hyperforin, and erisotrin. Leaves contain erisotrin, erisodin, and erythrolin. Seeds contain hyperforin, erisopin, and erisotin. A literature survey has revealed that the finding of phytoconstituents is still to be reported in these plants. The two major Phytochemicals discussed here are alkaloids and flavonoids whereas other phytochemicals are also present in plant parts such as leaves etc. The plant is a rich source of alkaloids (2.5%). The major alkaloids are erythraline, erysodine, stigmasterol, erycristagallin, erysovine, erysotrine, epilupeol, 6-Hydroxygenistein, erythritol, isocolinine, 3β, 28-Dihydroxyolean-12-ene, erystagallin isolated mainly from leaves. Flavonoids are chemical phenylbenzopyrones, which, usually conjugated with sugars, are present in all vascular plants. Isoflavonoids are reported to be the major phytoconstituents of *E. variegata*. It

contains mainly erythrinins A, B, and C, Erythrabyssin I, Orientanol, alpinium isoflavone, Dihydrofolinium, and Octacosylferulate are found in plant and plants parts.

Analysis of Standardization in the Erythrina variegata leaf:

Proximate analysis involving estimation of ash and extractive values of a crude drug is a means for the evaluation of crude drugs, the establishment of genuineness, and ruling out all forms of adulteration. While extractive values provide a process of the assay for drugs that are not readily estimated by other means, the determination of ash values is useful for detecting low-grade products, exhausted drugs, and the presence of sandy, earthy matter. Ash value figures indicate the absence of adulteration with the sandy matter. The total ash value could be low, due to the relatively low content of carbonates, phosphates, silicates, and silica in the drugs. Low ash value is attributable to the collection of plant material free of adherent earthy matter. Dried leaves of Erythrina variegata being taken, its LOD is lesser relative. The lower yield of a water-soluble extract of Erythrina variegata, and a higher relative proportion of chloroform and ethyl acetate soluble, indicates the predominance of polar constituents.

The herbal extract contains different phytochemicals with biological activity that can be of valuable therapeutic index. In the present investigation, characteristics of pharmacognostical significance of Erythrina variegata leaves the show, total ash, acid insoluble ash, loss on drying, Alcohol soluble extractive value, and water-soluble extractive value, determined. The standardization values of Erythrina variegata Phytotherapeutically, tannin-containing plants are used to treat nonspecific diarrhea, inflammations of mouth and throat, and slightly injured skins. The leaf juice has been used for the treatment of asthma, cough, sexual disorders, diarrhea, haematuria, earache and toothache, migraine, eye troubles, gastric problems, and scabies; leaf decoction has been used as an analgesic for toothache.

Inorganic ions Present in Erythrina variegata Leaf:

Inorganic ions in plants are ions necessary for vital cellular activity. The results of the qualitative inorganic ion analysis. The ions such as magnesium, potassium, iron, calcium, sodium, nitrate, sulfate, and chloride are present in Erythrina variegata. The reported mineral content is in agreement with the usage of the tender leaves of Erythrina variegata as an edible. Analysis of Physico-Chemical and Qualitative Inorganic Elements in the Selected Herbal Plants stated that the effectiveness of plant products promotes the pharmaceutical use of herbs for health problems. The inorganic content in all the plant parts ranked, next to the

organic content. Analysis of qualitative different inorganic elements for acid radicals like sulfate, sulfide, chloride, nitrate & nitrite and basic radicals like iron, magnesium, calcium, sodium, and potassium.

PHARMACOLOGICAL ASPECTS:

Indian coral tree in the South Pacific, in Pohnpei the leaves are reportedly used to make a drink to cure curses, and the smoke from leaves, bark, or roots is inhaled for the same purpose. The leaves and bark are reportedly used as a portion to treat stomach aches. In Tonga the bark is mixed with others and used to treat stomach aches. In Samoa, the leaves are occasionally used to treat eye ailments, and the bark is applied to swelling. In India, China, and Southeast Asia, the bark and leaves are used in many traditional medicines, including one said to destroy pathogenic parasites and relieve joint pain, the juice from the leaves is mixed with honey and ingested to treat tapeworm, roundworm, and threadworm. In India; women take this juice to stimulate lactation and menstruation; it is commonly mixed with castor oil to treat dysentery; a warm poultice of the leaves is applied externally to relieve rheumatic joints and the bark is used as a laxative, diuretics, and expectorants.

Analgesic and anti-inflammatory

The alkaloids extracted from the leaves of *Erythrina variegata* are reported to have anti-inflammatory activity. The leaves and barks are also used in fever and rheumatism. It has been reported that in the acetic acid-induced writhing model the methanolic extract of the leaf of *Erythrina variegata* at a dose of 500mg/kg showed significant antinociceptive activity with 49.03% inhibition of writhing response. The result was statistically significant ($p < 0.01$) in comparison to the control. In the radiant heat tail-flick model the extract also showed a significant increase in the tail-flick latency at a dose of 500mg/kg body weight with 36.02% elongation of tail-flick time.

Anti-osteoporotic Effect:

The study showed that *E. indica* (syn: *E. variegata*) could suppress the high rate of bone turnover induced by estrogen deficiency and improve the biomechanical properties of bone in the lab rats. / *Journal of Ethnopharmacology* / July 11, 2006

Cytotoxicity:

The study isolated five compounds from the methanol extract of the stem bark of EV: epilupeol, 6-hydroxygenistein, 3 β , 28- dihydroxyolean-12-ene, epilupeol, and stigmasterol. Diferentpartitionates showed mild to moderate antimicrobial activity and varying degrees of cytotoxicity. Journal of Phytochemistry August 01, 2001.

Anti-ulcer activity:

S Sakat Sachin et.al studied the Antiulcer activity of methanol extract of Erythrina indica (family: Fabaceae) leaves in pylorus ligated and indomethacin-induced ulceration in the albino rats. The methanol extract of E. indica leaves possesses significant antiulcer properties in a dose-dependent manner. In conclusion, the antiulcer properties of the extract may be attributed to the polyphenolic compounds that are present in it. / Pharmacognosy magazine / December 2009.

Diuretic Activity:

The method of Lipschitz et al was employed for the evaluation of the diuretic activity. The animals were divided into five groups (six in each) deprived of food and water for 18h before the experiment. On the day of the experiment, the Group I animals received normal saline (20 ml/kg.), the Group II animals received furosemide (20 mg/kg), the Group III, IV, and V animals received Ethanol, Chloroform, and Ethyl acetate extracts (250 mg/kg) respectively. Immediately after the administration, the animals were kept in metallic cages (two per cage) specially designed to separate urine and fecal matter and kept at room temperature (20 \pm 0.5 $^{\circ}$ C). The total volume of urine was collected at the end of 5h. During this period no water and food were made available to the animals. The parameters accounted for ascertaining the diuretic activities are the total volume of urine and the urine concentration of Na⁺, K⁺, and Cl⁻. The Na⁺ and K⁺ were measured by β ame photometry and Cl⁻ concentration was estimated by titration with silver nitrate solution (N/50) using 3 drops of potassium chromate as an indicator. The student T. value was employed for statistical analysis. All the values expressed are Mean \pm S.E.M. P < 0.05 (Compared to control) was considered significant. International Journal Of Green Pharmacy / July 11, 2008.

Cardiovascular effects:

G.K. Chatterjee et.al studied, the intravenous administration of the aqueous extract at a dose, varying from 0.1-0.4mg/kg produced a sharp and short-lived fall in B.P., both in cats and rats in acute experiments. The cats were more sensitive as regards the hypotensive action than rats since a moderate fall was noted with 0.12 mg/kg while in rats the hypotensive response was noted only after 0.4 mg/kg. On the isolated frog hearts the extract has no action in smaller doses but a dose of 5mg resulted in a complete but reversible block of the heart. / Indian Journal of Pharmacology / March 20, 1981

Effect on skeletal muscle:

G.K. Chatterjee et.al were studied, the aqueous extract as such failed to produce any response in isolated frog rectus abdominis muscle and did not influence the acetylcholine-induced contractions even with a dose up to 7.5×10^{-5} g/ml./ Indian Journal Of Pharmacology / March 20 1981

Effect on smooth muscle:

G.K. Chatterjee et.al studied, the aqueous extract produced a contraction of intestinal smooth muscle in isolated guineapig-ileum preparations at a dose of 1.3×10^{-5} g/ml; it is abolished by pretreating the ileum with diphenhydramine but not abolished by pretreatment with atropine. Indian Journal Of Pharmacology / March 20, 1981

CNS effects:

G.K. Chatterjee et.al reported to the extract was relatively non-toxic and the mice can tolerate a dose of more than 500 mg/kg, IP of the extract. For CNS activity the extract was administrated at a dose of 80 mg/kg im. Pretreatment of a mouse with the extract neither potentiated nor reduced the pentobarbitone dose-induced sleeping time. Similarly, the extract failed to protect the mouse significantly from pentylenetetrazol-induced convulsions. Indian Journal Of Pharmacology / March 20 198.

Antioxidant activity:

Saraswathy A., et.al were investigated the ethanolic extract of the stem bark of *Erythrina indica* was screened for its in-vitro antioxidant activity by Ferric thiocyanate (FTC) and

thiobarbituric acid (TBA) methods were employed and it was found that the ethanolic extract of the stem bark of erythrina indica possesses significant antioxidant activity.

Toxicity:

In a toxicity study, a large dose of this plant extract administration causes liver and kidney disorders in rats and pigeons. No toxicity has been reported with the standard dose in humans.

CONCLUSION

In India, Rural peoples are well aware of the usage of Medicinal Plants. Apart from that Botanists and Ayurvedic Practitioners also possess a good knowledge about plants. In these studies, there was much attention on this plant “Erythrina variegata” and their morphology, medicinal importance, Biochemical, Utilisation, Nutritive value of Foliage Phytochemical Screening of Leaf, Analysis of Standardization of Leaf and Inorganic ions presence in Leaf were studied to bring the Known and Unknown medicinal virtues, especially of plant origin to Limelight. In the present review article, the Literature is to collect the Botanical, Phytochemical, Use and management, and Pharmacological information of “Erythrina variegata”. Each part of the Plant especially the leaf is used to treat various diseases in India. The different extracts of erythrina variegata showed anticonvulsant activity, anti-bacterial activity, anti-microbial activity, diuretic activity, etc. Erythrina variegata has many uses as medicine yet its therapeutic efficacy has been assessed the majority in a few cases.

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