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Review Article

Combretum Indicum Linn. A Comprehensive Review of Phytochemistry and Pharmacological Properties

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ABSTRACT

Combretum indicum, known as Rangoon Creeper, belongs to the family Combretaceae which consists of over 600 species and 20 genera. This vining plant is found in both tropical and subtropical climates and is often found in the South-eastern part of Asia and the Philippines. In addition to its beautifying properties, it is also renowned for its many healing applications in both modern and alternative medicine practices. The pharmacological characteristics of the plant are affected by a variety of its phytochemicals, Including alkaloids, flavonoids, tannins, glycosides, saponins, steroids and phenolic compounds. Some of its leaves, flowers, fruits and roots have been used for the treatment of fever, rheumatism, nephritis, skin diseases, migraine, dysuria and many more. The potential usage of this plant as a medicinal tool has been supported by the presence of bioactive compounds found in the plant through phytochemical screening, such as quercetin, rutin, Quisqualis acid and several amino acids.Various pharmacological studies have shown that the plant possess multiple bioactivities such as immunomodulatory, anti-diabetic, anti-inflammatory, antioxidant, antibacterial, anthelmintic, analgesic, anti-dyslipidaemia and anti-asthmatic activities. Due to the wide range of therapeutic properties, the plant C. indicum is easily accessible and fast growing. This gives the plant great potential for further pharmacological studies and drug development.

INTRODUCTION

Combretum indicum belongs to the family Combretaceace. The family is comprised of more than twenty genera and six hundred species, which makes it quite large. It is also known as *Quisqualis indica*. The term Quisqualis, which pertains to stems and plant parts of different colors, comes from the Malay word Udani. The term "indica" means Indian.[1] Other names for it are Basantilata and Rangoon Creeper in English and Madhumalti in Kannada. It is most dominantly found in certain

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parts of India such as the southern parts of Karnataka, Kerala, Tamil Nadu and Hyderabad.[2] This is a flowering plant that forms one of the largest families under the order Myrtales, along with Angiosperms.[3] It is a big straggling or climbing shrub that grows through stiff, hook-like petioles of fallen leaves. Younger regions have a rusty appearance because of the brown hairs. The leaves are opposite or elliptical. The red, pink or white colored flower clusters are from the three main colors that this plant can produce. The blooms change their color as the time and temperature decreases. The bloom's color begins as white, then transforms into a lovely pink before finally turning red.[4] The indica quisqualis Linn plants have more uses in modern medicine, either directly as traditional remedies or indirectly as pharmaceutical preparations. A vine easy to propagate, *Quisqualis indica* Linn. is now more artfully treasured in gardens but also holds various traditional medicinal uses.[2] All the Phyto-constituents in this plant are geared towards the formulation of proper health and human health. The major substances collected during phytochemical screening include alkaloids, carbohydrates, proteins, amino acids, saponins, glycosides, steroids, tannins, flavonoids and phenolic compounds.[5] Folklore asserts that the parts of this medicine have varying uses. The leaf appears to be the most useful of all. Headaches are relieved by placing the leaves on the patient's forehead. Leaves that have been smashed are applied to the skin to help heal skin diseases. For dysuria, infusion of the leaves is used. During snake and animal bites, the Ayta people of Dinalupan, Bataan apply hot poultices of the leaves.[6] In India and Ambonia the leaves are used in a compound infusion for abdominal distention. The leaves and the fruit are recorded to be anthelmintic, but they are also used for kidney inflammation. Rheumatism is cured by the roots of the plants. Another treatment for nephropathy is fruit infusion used as gargle.[7] Since it is available in almost all seasons and its growth rate is fast, this kind of plant can be used in the making of different herbal medicine.

Fig No. 1: *Combretum indicum* plant

Scientific Classification[8]

Kingdom	Plantae
Order	Myrtales
Family	Combretaceae
Genus	*Combretum*
Species	*C. indicum*
Phylum	Streptophyta
Synonym	*Quisqualis indica*

Vernacular Names[9,10]

English	Rangoon creeper
Kannada	Melati
Hindi	Madhumalti
Tamil	Irangun malli
Malayalam	Pullanni
Telugu	Rodha manoharam

Geographical Distribution[11]

It is a plant that grows extremely fast, which supports its need for strong vertical support so it doesn't grow wildly on itself. This evergreen plant is found through the tropics and with its brief spreads to warm regions like Argentina, South Africa, Australia, Bermuda, China, and India. It is

used as a decorative plant in multiple gardens. The two largest subfamilies of the family are Terminalia and Combretum, are known to be present on every continent. Found in the region of secondary forest and thicket of the Philippines, it is also planted decoratively for its flowers and it is also found in India.

Description Of the Plant

This beautiful tropical vine can be observed with several cloaks where they differ by their leaves size and flowers color blooming them. Unlike other plants, this vine can grow up to 21 meters in wildlife, but cultivated land gives it a limit between 2 and 9 meters. It's branches that cascade down are adorned with bright green, fresh leaves and a plethora of axillary and terminal drooping racemose inflorescences are visible during optimal growth periods. They measure 7 to 15 cm in length and are elliptic to oblong, having an acuminated tip and rounded base.

Fig. No.2: Leaves

It is common to see a rounded leafed stem and in the tropics, a variety is always flowering no matter the season. The original Rangoon creeper with thorns has red single flowers, while the Thai hybrid variety features blooms that emit a heady scent and double blossom. Beautiful flowering clusters change over a three day period which showcases three colors at once, starting as white, changing to deep and bright pinks, then ending in reddish purples.[12]

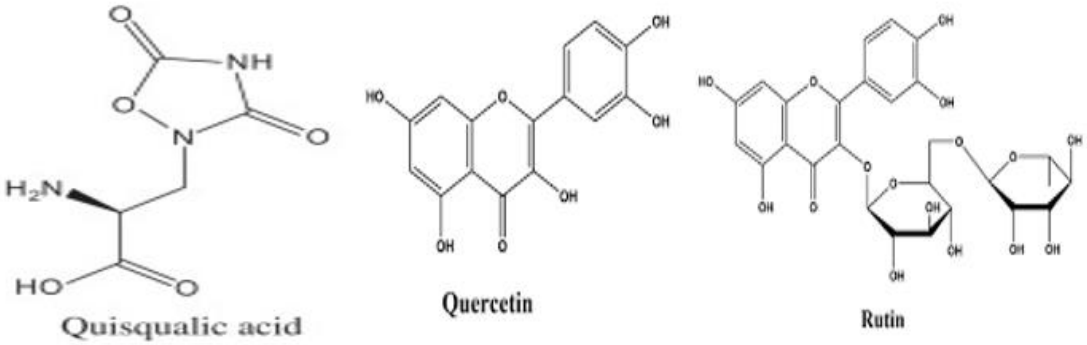
Fig.No.3: Flowers

It's fruit is an ellipsoidal-shaped object, 30 to 35 mm long, with five distinguishing wings, which appear when the fruit is fully ripe retaining an almond-like flavor. The fruit's outline resembles a pentagon and when separated, reveals black seeds inside that measure around 12 to 15 mm. The fruit is 2.5 to 3 cm and is maximally elliptical.[9]

Chemical Constituents[13, 14]

The study of phytochemicals in *Combretum indicum* has gained attention over the past few decades. This plant has diverse traditional usages due to a wide range of phytoconstituents found in it, such as steroids, alkaloids like carbamate, terpenoids, saponins, carbohydrates, proteins, amino acids and quinone. Rutin, pelargonidin-3-glucoside, quisqualic acid and mannitol are among the many phytochemicals that *Combretum indicum* possesses. Various amino acids including arginine, aspartic acid, proline, and histidine are also present in the plant. The phytochemical screening of the leaf extract revealed the following compounds like rutin, arjunolic acid, oleanolic acid, trigonelline, vitexin, orientin, iso-orientin and several monosaccharides including D-glucose and D-fructose. The flowers of *Combretum indicum* are composed of numerous phytochemicals including linalool oxides, quercetin, gallic acid and pelargonidin 3-glucoside. Seeds contains linoleic acid, oleic acid, myristic acid, stearic acid, palmitic acid, arachidic

acid and mannitol. An organic acid that is similar to cathartic acid and a sweet component similar to levulose were also found in the fruits.



Medicinal Uses [15,16]

Combretum indicum is said to be useful in treating ringworm, rickettsia, common cold, loose bowels as well as coughing. Seed is used for treatment of fever, diarrheal, boil, ulceristic conditions in Bangladesh is also common place. For those suffering from dropsy, the leaves and seeds act as anthelminthic tools. Young children are said to cough less after having steamed exposed to the leaves and seeds. Roots can be utilized as a treatment for parasitic worms and even as a remedy for diarrhoea. In addition, it may also be used to alleviate rheumatism.

Pharmacological Activities

Immunomodulatory Activity [11]

The hydroalcoholic extract of *Combretum indicum* Linn. flower has demonstrated strong immunostimulatory effects. It is directed mainly at macrophages which is the first line of defence and is crucial in the engulfment of infections and thus the triggering of the innate immune response. Particularly, the extract's phagocytic index showed remarkable increases in phagocytosis suggesting that it can serve as an immunomodulator. This indicates that *Combretum indicum* can perhaps be utilized to augment the body's immune systems.

Anti-Inflammatory Activity [17]

Combretum indicum has anti-inflammatory activity was evaluated in the study with acute and chronic inflammatory models. The hydro-alcoholic filament extract with high polyphenols and flavonoids showed significant anti-inflammatory activity by blocking the formation of prostaglandins. The extract showed promising results in both acute like the acetic acid and chronic like cotton-pellet induced granuloma models. From these results, it can be deduced that it can serve as a potential natural anti-inflammatory candidate to replace synthetic NSAIDs. The presence of bioactive compounds such as flavonoids and polyphenols is the reason for its anti-inflammatory effects.

Antioxidants Activity [4]

The methanolic extract of *Combretum indicum* Linn. demonstrated 95% antioxidant activity, primarily due to its redox properties that allow it to act as a reducing agent. As a result, the extract is capable of scavenging free radicals like lipid peroxyls, hydroperoxides and peroxides, which help in preventing degenerative diseases due to oxidative processes. The stem bark of this plant has also shown significant antioxidant activity.

Anthelmintic Activity [18]

In relation to the extracts tested, the results revealed that all worms suffered a form of paralysis that started with loss of mobility and concluded with the dead stage of lack of reaction to external stimuli.

Cytotoxic activity [15]

According to the study on extracts from *Combretum indicum* Linn, different sections of the plant and their solvents showed different levels of cytotoxic activity. The strongest cytotoxic activity was observed in petroleum ether-flower, ethyl acetate-leaf and ethanol-flower extracts, with the ethyl acetate-flower extract exhibiting the greatest. The root and stem extracts showed very slight cytotoxic activity.

Antimicrobial Activity [19]

The flower, leaf and bark extracts of *Combretum indicum* were tested for their antimicrobial activities in petroleum ether by the agar well diffusion method on human pathogens Pseudomonas aeruginosa, Bacillus cereus, Staphylococcus aureus and Escherichia coli. In higher doses (400µg/ml), the petroleum ether extracts of *C. indicum* flowers, leaves and bark gave the greatest zone of inhibition for both Gram positive and Gram negative bacteria.

Analgesic Activity [20]

The hot plate and tail flick tests were used to measure analgesic activity, increased reaction time relative to heat stimulus indicates analgesic efficacy. It suggests the action of dominant parts of the brain on the tolerance to stress. The analgesic activity observed on *Combretum indicum* Linn. in this study suggests activity in the central nervous system, which affirms its traditional use for pain relief.

Anti-diabetic activity [13,21]

Exploration of antidiabetic efficacy of *Combretum indicum* leaf extract proved the most promising effects. The streptozotocin induced diabetic rats demonstrated significant reduction in raised blood glucose, total cholesterol, triglycerides and low-density lipoprotein (LDL) cholesterol after the treatment with different doses of methanolic extract containing steroids. Help to alleviate the symptoms of diabetes.

Anti -asthmatic Activity [22]

Combretum indicum leaves extracts were shown to have anti-allergic action by inhibiting mast cell degranulation, as well as eosinophil and white blood cell reduction. LPE and LME extracts at the dose of 400 mg/kg exhibited mast cell protection in tissues with LME having the most potent effect similar to a standard drug.

CONCLUSION

Combretum indicum (L.) is a relatively new plant with many pharmacological features. It is known as a therapeutic plant that can be used for different pharmacological purposes. The plant is rich in phytochemicals which could be useful for treating different conditions such as diabetes, infections, inflammation and pain. It is frequently employed in modern as well as traditional medicine due to its ornamental and medicinal value.

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