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A REVIEW ON: PHARMACOLOGICAL ACTIVITY OF *ANTHOCEPHALUS CADAMBA*

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ABSTRACT

Anthocephalus Cadamba, belonging to Family Rubiaceae. It is one such as a ayurvedic remedy which is use for medicinal purpose in several countries such as china, India, and Egypt. They are well known for the medical usage of the herbal plants in hopeless disorder. The therapeutic uses of its flower, root, bark, leave and stem against the various disorders like diabetic mellitus, diarrhea, fever, inflammation, haemophysis, cough, vomiting, wounds, ulcer, debility and also useful for snake bite. The major constituents of the plant are triterpenes, triterpenoid glycosides, flavanoids, saponins, indole alkaloids, indole alkaloids, cadamine, isocadambine, isocadambine. In this article, we review the pharmacological activity and toxicological studies of *Anthocephalus Cadamba*.

KEYWORDS: *Anthocephalus Cadamba*, Introduction, Plant profile, Traditional uses, Pharmacological activities.

INTRODUCTION

Medicinal plants play an important role for health maintenance of the largest portion of the world population.[1,2,3] There are number of plant which is for medicinal purpose in several countries. Ayurvedic science established in India and Its neighboring countries. India also known as botanical paradise due to largest producer of the medicinal plants.[4,5,6,7] Medicinal plant can cure several disease and aliments such as diabetic, cardiovascular, cancer and liver damage.[8,9,10]

Anthocephalus Cadamba (Rubiaceae) a Miq., Syn. A. indicus, A. rich, A.chiensis (Lam.) Rich. Ex. Walp, *Neolamarckia cadamba* (Roxb.) Bosser. (Family-Rubiaceae) commonly known as Kadamba.[11] It is also known as wild chinchon. It is utilized for medicinal purpose

in several disease like fever, leprosy, dysentery, blood, and skin. It is also posses wound healing, anti oxidant and hepatoprotective activity.[12,13]

Anthocephalus Cadamba is one such ayurvedic remedy which is use mention in many Indian literatures for its pharmacological activity like anti diarrheal and detoxifier, analgesic and seminal fluids. In traditional system aqueous extract of the *Anthocephalus Cadamba* leaf has been used to alleviated pain, swelling, and wounds as well as treatment of menorrhagia. The decoction of the bark effective for diarrhea, dysentery and colitis and bark also beneficial for skin infection.[14]

Figure no. 1: Picture of *Anthophalus cadamba* Tree.

DISTRIBUTION

In India it is found in chota Nagpur (Bihar), Orissa, Andhra Pradesh, Andaman, Karnataka, and Kerala and Madhya Pradesh. It is also distribute in Thailand and indo-china and cast ward in Malaysian Archipelago to papua new guinea.[15]

PLANT PROFILE

Plant Discripition

Anthocephalus cadmaba is a larger tree, the height of this tree may reach 20-45 m and the diameter of truck is 100-160 cm with broad crown and straight cylindrical bole. At the age of 4 years kadam may start flowering. In India it is flowering in July to December. Flowers are bisexual.[16]

Bark: The bark is dark gray on color, it is smooth and very light in the young tree but rough in old tree. The bark is use for skin infection. *Anthocephalus cadamba* bark is use for hoarseness of throat, when the bark is mix with water, honey and cumin (zeera). It is giver to

the patient orally. The in water use for bath which makes skin soft and free from all infection.[17]

Figure no.2: Bark of *Anthophalus cadamba* Tree.

Leaf: Leaves glossy green, opposite, simple more or less sessile to etiolate, ovate to elliptical (15-50 x 8-25 cm). Inflorescence in clusters; terminal globose heads without bracteoles, sub sessile fragrant, orange or yellow flowers; Flowers bisexual, 5-merous, calyx tube funnel-shaped, corolla gamopetalous saucer shaped with a narrow tube, the narrow lobes imbricate in bud. Stamens 5, inserted on the corolla tube, filaments short, and anthers basified. Ovary inferior, binocular, sometimes 4-locular in the upper part, style exerted and a spindle-shaped stigma. Fruit lets numerous with their upper parts containing 4 hollow or solid structures. Seed trigonal or irregularly shaped.[1]

Figure no.3: Leaves of *Anthophalus cadamba* tree.

Flower: The flowers are small, orange in colour, in globose head which are in 3-5 cm in dia meter.Flowers bisexual, 5-merous, calyx tube funnel-shaped, corolla gamopetalous saucer-shaped with a narrow tube, the narrow lobes imbricate in bud. Stamens 5, inserted on the corolla tube, filaments short, anthers basifixed. Ovary inferior, binocular, sometimes 4-locular in the upper part, style exerted and a spindle-shaped stigma.[1] Flower are use as vegetable.

Figure no. 4: Flower of *Anthophalus cadamba.*

Fruit: Fruit let numerous with their upper parts containing 4 hollow or solid structure.[1]fruits are fleshy, orange,globose pseudocarps 5-7 cm in diameter and yellow when ripes.[18,19.20]

Figure no.-5: Fruit of *Anthophalus cadamba.*

Scientific Classification.

Botanical name	*Anthocephaluscadamba* (Roxb.) Miq.
Family	Rubiaceae
Subfamily	Cinchonoideae

Taxonomical Classification

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Gentianales
Family	Rubiaceae
Genus	Anthocephalus
Species	cadamba
Vernacular Name	Kadamb

Vernacular Name

Language	Name
Hindi	Kadam, Kadamba
Gujarati:	Kadamb, Kadam
Sanskrit:	VrttaPuspa, Priyka
English:	wild cinchona
Marathi	Kadamb
Punjabi	Kadamb

Synonyms

- Anthocephaluschinensis (Lamk.) A. Rich. ex Walp.
- Sarcocephaluscadamba (Roxb.) Kurz.
- Anthocephalusmacrophyllus (Roxb.) Havil.
- Anthocephalus indicus A. Rich.
- Naucleacadamba (Roxb.)
- AnthocephalusmorindaefoliusKorth.
- Neolamarckiacadamba (Roxb.) Bosser

CHEMICAL CONSTITUENTS

Bark	Astringent[11] Tannins,[21]
Stem	Triterpenicacid, cadambagenicacid, quinovic acid, β sitosterol[22]
Leaf	Glycosidicindolealkaloids;cadambine,3α-dihydrocadambineisodihydrocadambine[23,24] and two related non-glycosidic alkaloids; cadamine and isocadamine[25]
Fruit	Essential oil and the main constituents of oils are linalool, geraniol, geranyl acetate, linalyl acetate, α-selinene, 2-nonanol, β-phellandrene, α-bergamottin, *p*-cymol, curcumene, terpinolene, camphene and myrcene.[11]
Whole Plant	Indole alkaloids, terpenoids, sapogenins, saponins, terpenes, steroids,fats and reducing sugars.
Seeds	The seeds of *Anthocephalus indicus* composed of water-soluble polysaccharides D-xylose, D-mannose and D-glucose in the molar ratio 1:3:5.[11,19]

Properties

Taste	Bitter
Qualities	Dry In Nature
Potency	Cold
Specification Action	Pain Reliefs

AYURVEDIC USES

Santals

S.No.	Part	Use
1.	Bark	Paste is given to the patients of continuous fever to drink, juice squeezed out from the paste obtained by grinding this bark along with barks of mango tree and sal tree is given to the patient of cholera with a little shell lime;
2.	Decoction of stem-bark	Given to the patient of dyspepsia;
3.	Leaf	To cover sores and wounds, Juice of leaf with common salt: in stomach pain.

Shukla Yajurveda

S.No.	Part	Use
1.	Bark	Strengthens body and removes fever, in rectifying defects of semen, to cure urinary troubles;
2.	Leaf	Cures pimples and wounds, analgesic;
3.	Leaf- juice	Stops burning sensation of palms and feet and scaling off of skin; Extract of leaf: for gurgle
4.	Fruit	Good to quench thirst during high fever

Shushrutasamhita

S.No.	Part	Use
1.	Leaf	Analgesic, useful in diseases caused by phlegm, rheumatism and in inflammation of glands;

Medicinal and Traditional Use

- Diabetes Mellitus
- Diarrhoea
- Reducing Fever
- Inflammation
- Cough
- Vomiting
- Wound
- Haemoptysis
- Ulcer
- Debility and Antimicrobial Activity

PHARMACOLOGICAL ACTIVITIES

Analgesic, antipyretic and anti-inflammatory activities

Extracts of the bark and leaf of *Anthocephaluscadamba*possess the analgesic, antipyretic and anti-inflammatory activities. The defatted aqueous extract of the leaves of *Anthocephaluscadamba*showed significant analgesic and anti-inflammatory activity at varying doses (50, 100, 300 and 500 mg/kg).[26,27] The methanolic extract of the bark of *Anthocephaluscadamba*was successfully evaluated for analgesic, antipyretic and anti-inflammatory activities by some workers.[28,29]

Antidiabetic activity

The alcoholic extract of the stem bark of *Anthocephaluscadamba*, syn. *Neolamarckiacadamba*has been reported to exhibit antidiabetic (hypoglycemic) potential in alloxan (120-150 mg/kg) induced diabetic rats and rectifying the problems like fatigue and irritation associated with this disease. The experimental studies showed that the 400-500 mg/kg extract of drug are effective in the treatment of diabetes and it is thought to be due to the presence of flavonoids, which stimulate the insulin secretion or possess an insulin-like effect.[30,31] The alcoholic and aqueous extract of the roots of *Anthocephaluscadamba*also possess the anti-diabetic activity in dose 400 mg/kg body weight and was tested against the normoglycaemic and alloxan inducedhyperglycaemic rats.[32]

Antidiarrhoeal activity

The dry hydroethanolic extract (200-500mg/kg) of the flowering tops of *Anthocephaluscadamba*exhibited a dose-dependent decrease in the frequency of faecal dropping in castor oil induced diarrheoea in mice. The extract also produced a dose-dependent reduction in intestinal fluids accumulation.[33]

Diuretic and laxative activity

The various extracts of the barks of *Neolamarckiacadamba*were studied for its diuretic and laxative activity and it was found that the methanol extract (300 mg/kg) of the bark of *Neolamarckiacadamba*significantly showed in increases the urinary output (diuresis) as compared with aqueous, chloroform and petroleum ether extract, whereas the chloroform extract (300 mg/kg) produced significant laxative property.[34]

Anti-hepatotoxic effects

*Anthocephaluscadamba*have been reported to be used for its hepatoprotective activity. The hepatoprotective activity is due to the presence of chlorogenic acid (CGA) isolated from *Anthocephaluscadamba*. It was also found that the intraperitoneal administration of CGA to mice at a dose of 100 mg/kg for 8 days exhibited a better liver protective action than silymarin (SM), in CCl4 administered mice. The antioxidative activity of CGA is responsible for its hepatoprotective nature. CCl4 is used as a model of liver injury.[35]

Hypolipidemic activity

From the experimental studies carried out by the workers showed the marked decrease in the lipid level in alloxan (150 mg/kg body wt.) induced diabetic rats. Oral administration of root extract (500 mg/kg body wt.) of *Anthocephalus indicus* for 30 days in dyslipidemic animals resulted in significant decrease in total cholesterol, phospholipids, triglycerides and lipid peroxides.[36]

Antioxidant activity

The extract of *Anthocephaluscadamba*Syn. *A. indicus* possesses potent antioxidant activity by inhibiting lipid peroxidation and increase in the superoxide dismustase (SOD) and catalase activity.[36,37]

Antimicrobial and wound healing activity

*Anthocephaluscadamba*has been reported for antimicrobial activitites. The plant have been reported to posses potent antibacterial and antifungal activity against *Escherichia coli, Micrococcus luteus, Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Salmonella typhi, Klebsiella pneumonia, Proteus mirabilis, Candida albicans, Trichophyton rubrum, Asperagillusniger, Asperagillus flavus* and *Asperagillusnidulans*.[37,38] The experimental evidence also show that *A. cadamba*extract has potent wound healing capacity.[37] The aqueous extract of *A.cadamba*also found effective against *Rathyibactertritici*a causal organism of tundu disease of wheat,[39] and effective against foot and mouth disease of animals.[40]

Anthelmintic activity

Aqueous and ethanolic extracts of mature bark of *Neolamarckiacadamba*has been reported for its anthelmentic activity against earthworms, tapeworms, and roundworms.[41]

TOXICOLOGICAL STUDIES

The methanolic extract of *Athocephalus cadamba* barks were studied for its toxicity in mouse models. The results suggested that acute toxicity was found in animal models at doses range higher than 300 mg/kg and there was no mortality found at 300 mg/kg dose in animal models. The sub-acute toxicity was carried out at dose 600 mg/kg. From the result it is suggested that *A. cadamba* is non-toxic at doses of 600 mg/kg.[42]

CONCLUSION

Research in medicinal plant has gained a renewed focus recently. The main reason is that the other system of medicine associated with number of side effects that often cause to serious problems. Though *Anthocephalus Cadamba* has various medicinal activities but it is time to explore its medicinal values at molecular level with the help of various biotechnological techniques. Few toxicological studies have been reported. The work could also be done in this direction to ensure free utility of the plant.

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