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**PHARMACOLOGICAL ACTIVITIES OF *ANTHOCEPHALUS CADAMBA*: A  
CONCISE REVIEW**

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Received 12<sup>th</sup> May 2020; Revised 8<sup>th</sup> June 2020; Accepted 14<sup>th</sup> July 2020; Available online 1<sup>st</sup> March 2021

<https://doi.org/10.31032/IJBPAS/2021/10.3.5402>

**ABSTRACT**

*Anthocephalus cadamba*, is one of the significant medicinal plant belonging to Family Rubiaceae. It is an ayurvedic remedy which is use for therapeutic reason that has been referenced in numerous Indian medicinal literatures. Over the span of the latest couple of years, researchers have planned for recognizing and endorsing plant inferred substances for the treatment of various diseases. The plant has been studied for its different pharmacological activities, for example, antimicrobial, antidiabetic, sedative, antiepileptic, antioxidant, antitumor, analgesic, antipyretic, anti-inflammatory, diuretic, laxative, hepatoprotective, anthelmintic, wound healing and antidiarrhoeal.

The major constituents of the plant are triterpenes, triterpenoid glycosides, flavanoids, saponins, indole alkaloids, cadamine, isocadambine.

Here we have put forth an attempt to sum up all the phytochemicals and their significance to render the intrigue that would help in their commercialization.

**Keywords: *Anthocephalus cadamba*, Traditional uses, Pharmacological Activities, Chemical Constituents**

## INTRODUCTION

There is various flora being used for therapeutic purposes in the course of recent hundreds of years. Nations, for example, China, India, and Egypt are well known for the dynamic utilization of therapeutic plants in the treatment of different incurable infections. India is the biggest maker of restorative herbs in the world because of which it is regularly called an organic heaven. Ayurvedic science is profoundly established in India and its neighbouring nations [1]. Medicinal plants assume a significant role for wellbeing upkeep of the biggest portion of the world population [2].

*Anthocephalus cadamba* Syn. *A. indicus*, *A. rich*, *A. chiensis* (Lam.) Rich. Ex. Walp, (Family-Rubiaceae) regularly called kadamba enjoys a consecrated position in Ayurveda-an Indian indigenous arrangement of medication. It is likewise named as Kadam [3]. *A. cadamba* are mostly situated in deciduous forests and are commonly cultivated in fields. They are generally found in Asia, Australia, and the Pacific region. In India, they are mostly found in Kerala, Maharashtra, Tamil Nadu, Madhya Pradesh, Assam, and Andhra Pradesh. They are likewise cultivated in India, Pakistan, Sri Lanka, Burma,

Thailand, Laos, Vietnam, Cambodia, Indo-Malesia, and numerous other tropical regions everywhere throughout the world. Local scope of *Cadamba* is Australia, China, India, Indonesia, Malaysia, Papua New Guinea, Philippines, Singapore, Vietnam, and Maharashtra. In Maharashtra, it is broadly distributed over focal fields of Marathwada, dry deciduous forests of Vidarbha and Western Maharashtra, and sodden deciduous forests of Konkan [4].

### Plant Description:

*Anthocephalus cadamba* is an enormous tree with a broad crown and straight round and hollow bole. The tree: may arrive at a stature of 45 m with trunk distances across of 100 - 160 cm. The tree sometimes has little braces and a broad crown. The bark is dark, smooth in youthful trees, unpleasant and longitudinally fissured in old trees. Leaves look reflexive green, inverse, basic pretty much sessile to petiolate, applaud to curved. Inflorescence in bunches; terminal globose heads without bracteoles, subessile fragrant, orange or yellow blossoms; Flowers androgynous, 5-merous, calyx tube channel - formed, corolla gamopetalous saucer-molded with a tight flaps imbricate in bud [5].

Figure 1: *Anthocephalus chinensis* TreeFigure 2: *Anthocephalus chinensis* Fruit

### Chemical Constituents

Bark	Astringent Tannins.
Stem	Triterpenic acid, cadambagenic acid, quinovic acid, $\beta$ sitosterol
Leaf	Glycosidic indole alkaloids ; cadambine, 3 $\alpha$ – di hydro cadambine iso di hydro cadambine and two related non-glycosidic alkaloids; cadamine and isocadamine
Fruit	Essential oil and the main constituents of oils are linalool, geraniol, geranyl acetate, linalyl acetate, $\alpha$ -selinene, 2-nonanol, $\beta$ -phellandrene, $\alpha$ -bergamottin, p-cymol, curcumene, terpinolene, camphene and myrcene
Whole Plant	Indole alkaloids, terpenoids, sapogenins, saponins, terpenes, steroids, fats and reducing sugars
Seeds	The seeds of <i>Anthocephalus indicus</i> composed of water-soluble polysaccharides D-xylose, D-mannose and D-glucose in the molar ratio 1:3:5 [2]

### Medicinal & Traditional Uses

- Diarrhoea
- Diabetes Mellitus
- Reducing fever
- Vomiting
- Ulcer
- Fever
- Inflammation
- Antimicrobial activity
- Wound Healing. [6,7, 8,9]

**Reported Pharmacological Activities:**

**Antidiabetic activity:** -The Methanolic extract of *Anthocephalus cadamba* bark in alloxan incite hypoglycemia in rats. Hypoglycemia was observed greatest at 120 minutes after administration of *Anthocephalus cadamba* bark extract with a dose of 400 mg/kg [10, 11].

The hydroethanolic extract of the flowering tops of *Anthocephalus cadamba* (Roxb.) Miq. was investigated for its likely hypoglycemic effect in alloxan-induced diabetic rats. The results shows that the hydroethanolic extract of the flowering tops of *A. cadamba* (200 - 400 mg/kg) has hypoglycemic property and can shield liver and brain from oxidative damages brought about by diabetes [12].

**Hepatoprotective activity:** - The ethanolic extract of leaves of *Anthocephalus cadamba* (Roxb.) demonstrated significant hepatoprotective impact against paracetamol actuated liver damage model in rats. In this study the impact of ethanolic extract of *Anthocephalus cadamba* with various doses (200, 400, 600 mg/kg) on normal liver function were watched. Group which got plant extract 200 mg/kg b.w. & Paracetamol indicating mild hepatoprotective activity. Groups which received plant extract 400mg/kg b.w., 600mg/kg b.w. & Paracetamol demonstrating significant protection and normal design of liver tissues and cells

against given hepatotoxins. The result demonstrates that biochemical changes produced by paracetamol were re-established to normal by ethanolic extract [13].

The extract of *Anthocephalus cadamba* stem bark possess hepatoprotective property which may be mediated through augmentation of antioxidant defences. Hepatocuretive potential was assessed utilizing carbon tetrachloride intoxicated (CCl<sub>4</sub>) rat's model [14].

**Analgesic anti-inflammatory, & antipyretic Activity:** -Extracts of the bark and leaf of *Anthocephalus cadamba* have the analgesic, antipyretic and anti-inflammatory activities. The defatted fluid concentrate of the leaves of *Anthocephalus cadamba* demonstrated noteworthy analgesic and anti-inflammatory activity at different doses (50, 100, 300 and 500 mg/kg) [15, 16].

The methanolic extract of the bark of *Anthocephalus cadamba* was effectively assessed for analgesic, antipyretic and anti-inflammatory activities by certain labourers [17, 18].

**Antifungal, Antimicrobial & wound healing activity:** - Investigators reported that alcoholic and aqueous extracts of fruits (ripened & un-ripened) indicated significant anti-fungal activity against *Trichophyton rubrum*, *Candida albicans*, *Microsporium species*, *Aspergillus niger*,

with zone of hindrance of the maximum 15.0 mm and 12.0 mm against *Trichophyton rubrum* for ethanolic and hot water extracts, respectively. The MIC was as low as 2.00 mg/ml and 2.5 mg/ml for ethanolic and methanolic concentrates of ripened fruit of *Anthocephalus cadamba* against *Trichophyton rubrum* and *Aspergillus niger* respectively [19].

The plant various extracts have been reported to possess potent antibacterial and anti-fungal activity against *Escherichia coli*, *Micrococcus luteus*, *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Klebsiella pneumonia*, *Proteus mirabilis*, *Candida albicans*, *Trichophyton rubrum*, *Aspergillus niger*, *Aspergillus flavus* and *Aspergillus nidulans*. [20-23] The exploratory proof additionally shows that *Anthocephalus cadamba* extract has potent wound recuperating capacity [20].

**Antidiarrhoeal activity:** - The dry hydroethanolic extract (250-500mg/kg) of the blooming highest points of *Anthocephalus cadamba* showed a dose-dependent diminishing in the recurrence of faecal dropping in castor oil prompted diarrhoea in mice. The extract likewise delivered a dose-dependent decrease in intestinal fluids aggregation [24].

**Diuretic & laxative activity:** - Investigator studied different extracts of the barks of *Neolamarckia cadamba* for its diuretic and

laxative activity and reported that methanol extract of the bark of *Neolamarckia cadamba* significantly showed in increases the urinary yield (diuresis), though the chloroform extract delivered noteworthy laxative property [25].

**Antioxidant activity:** - The different extracts of leaves of *Anthocephalus cadamba* was studied for its antioxidant potential & reported that Ethyl acetate fraction showed a higher antioxidant activity followed by butanol fraction and remaining water fraction [26].

The extract of different parts of *Anthocephalus cadamba* possesses potent antioxidant activity evaluated by DPPH free radical scavenging assay & other assay [22, 27].

The extract of *Anthocephalus cadamba* has antioxidant activity by inhibiting lipid peroxidation and increase in the superoxide dismutase and catalase activity [20].

**Anthelmintic activity:** - Methanolic extract of *Neolamarckia cadamba* fruits has been reported for its anthelmintic activity against that was conducted on earthworm *Pheritima posthuma* [28].

The methanolic extract of the stem of *Neolamarckia cadamba* has anthelmintic activity that was reported against aquarium worm *Tubifex tubifex* [29].

**Sedative & antiepileptic activity:** - Ethanolic extract of bark of *Anthocephalus cadamba* possess sedative and antiepileptic

activities that was demonstrated against ketamine-induced sleeping time model & pentylenetetrazole, isoniazid and maximal electroshock-induced seizures [30].

**Hypolipidemic activity:** - Experimental studies carried out by the workers showed the marked decrease in the lipid level in alloxan (150 mg/kg body wt.) instigated 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 [31].

### CONCLUSION

*Anthocephalus cadamba* is a popular medicinal plant useful in various ailments & has been an ayurvedic remedy in numerous Indian conventional medications since long. It has recently proved to be a rich storehouse of chemical constituents. The watched assorted pharmacological properties may be credited to the presence of various compounds. However, future endeavours should focus more on contemplates planned for comprehension the component/s of activity at the sub-atomic level on the approved pharmacological activities. Few toxicological studies have been reported. The work should likewise be possible toward this path to guarantee free utility of the plant.

### ACKNOWLEDGEMENT

I am very much grateful to Prof.(Dr.) Ranjeet Singh; PVC & (Dr.) Zulphikar Ali; Asst. Prof. Adarsh Vijendra Institute of Pharmaceutical Sciences, Shobhit University, Gangoh, Saharanpur, UP, India for inspiring to write this article.

### CONFLICTS OF INTEREST

Author declares no conflict of interest.

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