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Phytochemical Screening of *Anthocephalus cadamba* (Roxb.) Miq. : Bark

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Abstract
Anthocephalus cadamba is one of such Medicinal Plant that has been mentioned in many Indian medicinal literatures. It is crucially significant as it has the largest number of phytochemicals and secondary metabolites having pharmacological and biological properties. The present work deals with development and standardization of phytochemical screening for quantification of stem bark extract of medicinal plant of *Anthocephalus cadamba* (Roxb.) Miq. The scientific parameter is necessary to identify the exact plant material and to find its quality and purity. The present study deals with various preliminary phytochemical screening of various successive extracts such as qualitative chemical analysis. The alkaloidal content of stem bark has been determined. These studies indicated the possible information for correct identification and standardization of this plant material.

Keywords: *Anthocephalus cadamba*, phytoconstituents, phytochemical screening, bark

Introduction
There are a number of floras in use for medicinal purposes over the past several centuries. Countries such as China, India, and Egypt are well known for the active usage of medicinal plants in the treatment of various incurable diseases. India is the largest producer of medicinal herbs in the world due to which it is often called a botanical paradise. Ayurvedic science is deeply rooted in India and its neighboring countries. It was developed even before the medieval period, when people had little knowledge of science. There are a number of ancient therapeutic measures based on medicinal plants that have been developed in India [1, 2, 3, 4]. They can cure several diseases and ailments such as diabetes, cardiovascular disorders, cancer, and liver damage [5, 6, 7].

Anthocephalus cadamba (Rubiaceae) commonly known as *Kadamba*. The other names of the plant are *Neolamarckia cadamba*, *Nauclea cadamba* (Roxb.), *Samama cadamba* (Roxb.) Kuntze, *Anthocephalus morindifolius* Korth., *Nauclea megaphylla* S. Moore, *Neonauclea megaphylla* etc. Other vernacular names have been listed in the Table1. The tree is highly regarded religiously and culturally in India being sacred to the Lord Krishna. Radha and Krishna conducted their love play in the hospitable and sweet-scented shade of the Kadamba tree [8]. Shiva and Parvati came to Sahyadri and there a child was born to the divine couple. Since the birth took place under a Kadamba tree, the child was named Kadamba, and was placed in charge of the Sahyadri region. The word Kadamba lends its name to the Kadamba Dynasty which ruled from Banavasi in what is now the state of Karnataka from 345 AD to 525 AD [9].

Anthocephalus cadamba is large tree with a broad umbrella-shaped crown and straight cylindrical bole. The branches are characteristically arranged in tiers. The tree may reach a height of 45 m with a stem diameter of 100–160 cm and sometimes it has a small buttress up to 2 m high. The bark is grey, smooth and very light in young trees, but rough and longitudinally fissured in old trees. The branches spread horizontally and drop at the tip. The leaves are glossy green, opposite, simple sessile to petiolate, ovate to elliptical (15–50 cm long by 8–25 cm wide). In young fertilised trees, the leaves are much larger, subordinate at base and acuminate at apex; the stipules are interpetiolar, narrowly triangular and deciduous. The fruitlets are numerous, somewhat fleshy, with their upper parts containing 4 hollow or solid structures. The fruit occurs in small, fleshy capsules packed closely together to form a fleshy yellow-orange infructescence containing approximately 8000 seeds. The seeds somewhat are trigonal or irregular shaped, not winged [10].

Md. Abu Shuaib Rafshanjani *et al.* (2014) [11] isolated from stem barks of *Anthocephalus cadamba* the active principles and to evaluate possible synergistic affects among the extract components for their cytotoxic properties Alekhya *et al*. (2013) [12] they reported from leaves and seeds of *Anthocephalus cadamba* best sources for obtaining natural antioxidants for various medicinal uses and ascorbic acid also present. The objective of this work is too carried out to explore the phytochemical constituents of the solvent extract of *A. cadamba*.

Table 1: Vernacular names of *A . cadamba.*

Sr. No.	Language	Names
1	Marathi	*Kadamba*
2	Hindi	*Kadamb*
3	Sanskrit	*Kadamba*
4	Telugu	*Kadambamu*
5	Bengali	*Kadam*
6	Tamil	Kapam,Vellai
7	Malayalam	*Attutek*
8	Kannada	*Kadawala*
9	English	*Wild cinchona*
10	Assam	*Roghu, Kadam*

Material and Method

Plant Material: The stem bark of Anthocephalus cadamba (Roxb.) Miq. Was collected from Shivaji Park, Paithan. The plant materials was identified and Authenticated by Dr. M. A. Kare, Department of Botany, Pratishthan Mahavidyalaya, Paithan.

Preparation of Extract: The stem bark of *Anthocephalus cadamba* (Roxb.)Miq. Shaded dried, and then these are made into coarsely powdered form using dry grinder. The powdered bark of the plant (180gm.) was packed in soxhlet apparatus and continuously extracted with petroleum ether (40-600C) till complete extraction, after completion of extraction the solvent was removed by distillation and then concentrated extract obtained was dried under reduced pressure using rotatory evaporator at temperature not exceeding 400C and then give moderate heating on water bath. A yellowish extract approximate 1 gm. was obtained. From the drug petroleum ether was removed and the defatted drug was extracted with methanol (95%) till complete extraction, after completion of extraction the solvent was removed by distillation and then concentrated extract obtained dried under reduced pressure at temperature not exceeding 400C and then give moderate heating on water bath. The methanolic extract obtained was dark yellow in color, weighed about 42.8 gm. The methanolic extract was kept in Petridis and it was stored in desiccators at cool place [13].

Result and Discussion

In plants phytochemicals are naturally present. They give colour, flavor, smell and texture. A part from that, phytochemicals could prevent diseases including cancer and cardiovascular diseases and inhibit pathogenic microorganisms. Nowadays the use of medicinal plants rapidly increases in medicine [14]. Phytochemical evaluation of methanolic extract of *Anthocephalus cadamba* (Roxb.)Miq. showed the presence of Tannins, Phenols, Alkaloids, Saponins, Iridoids, Quercetin, Kaempferol, Catechin, Coumarin, 6,7-Dimethoxy coumarin, 5-Methoxy genistein, Anthocyanin, Proanthocyanin, Carbohydrates, Flavonoids, Glycosides and Proteins (Table no. 2).

Phytochemical screening of the bark showed some differences in the presence of phytoconstituents which are known to have importance in medicine [15, 16, 17, 18, 19, 20]. The preliminary screening tests may be useful in the detection of the bioactive principles and subsequently may lead to the drug discovery and development [21, 22, 23, 24].

Saponins are found only in petroleum ether extract. Chloroform extract revealed the presence of carbohydrates and saponins. Ethanol extract showed the presence of alkaloids, flavonoids, glycosides, phenols, steroids, terpenoids and quinones whereas acetone extract showed the availability of alkaloids, flavonoids, phytosterols, phenols and proteins. Such alkaloids were effective against ovarian, brain, breast, lung cancer etc. [25, 26, 27, 28] and several of its semisynthetic analogues are 9-Nitro-CPT, 10-hydroxy-9-dimethylaminomethyl - CPT, 7-Ethyl- 10 -hydroxy-camptothecin (SN-38), are applied as clinical anticancer drugs in USA, Europe and Japan [29]. Other alkaloids include indicine, indicine N- oxide, thalicarpine and tetrandrine [30]. Flavonoids are also reported to have inhibitory action on growth and proliferation of different types of tumors [31].

Table 2: Phytochemical Tests of *A. cadamba.*

Sr. No.	Test	Methanol	Petro. Ether	Chloroform	Acetone
1	Tannins	+	-	+	+
2	Phenols	+	-	-	-
3	Alkaloids	+	-	-	-
4	Saponins	+	-	-	-
5	Iridoids	-	+	-	+
6	Quercetin	-	-	-	-
7	Kaempferol	-	-	-	-
8	Catechin	-	-	-	-
9	Coumarin	-	+	+	+
10	6,7-Dimethoxy coumarin	-	-	+	+
11	5-Methoxy genistein	-	-	+	-
12	Anthocyanin	-	+	-	-
13	Proanthocyanin	-	+	-	-
14	Carbohydrates	+	-	-	+
15	Flavonoids	+	-	+	-
16	Glycosides	+	-	+	-
17	Proteins	-	-	+	+

Conclusion

Various extracts was subjected to Pharmcoganostic Evaluation for the identification of various Phytoconstituents and rest of extracts were utilized for pharmacological screening. Phytochemical evaluation extract of *Anthocephalus cadamba* (Roxb.) Miq. Showed the presence of Tannins, Phenols, Alkaloids, Saponins, Iridoids, Quercetin, Kaempferol, Catechin, Coumarin, 6, 7-Dimethoxy coumarin, 5-Methoxy genistein, Anthocyanin, Proanthocyanin, Carbohydrates, Flavonoids, Glycosides and Proteins.

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