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Original Article

Phytochemical screening and total quantification of phenol in *Neolamarckia cadamba*

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Abstract

Traditional medical practices made extensive use of medicinal plants as a primary or secondary source of treatment for a wide range of human diseases and conditions. In the present study, phytochemical screening and total phenolic quantification of different extracts of Neolamarckia cadamba was done by standard procedures. Carbohydrates, sugar, proteins, steroids, tannins, saponin, phenol and alkaloids are present in petroleum ether, acetone and distilled water extracts of N. cadamba. Total quantification of phenol was analyzed in three extracts of cadamba. The value was provided in terms of the corresponding catechol. Its therapeutic efficacy may result from the presence of secondary metabolites. More research on N. cadamba is needed to see whether it has therapeutic promise for a wide range of illnesses.

Key words: Medicinal plant, natural products, secondary metabolites, catechol

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Introduction

Plants utilized traditionally for medicinal purposes are widely recognized as a valuable resource for the development of new treatments. Numerous pharmaceutical firms are actively doing research on diverse plant products for their potential therapeutic value as the demand for herbal products increases at an exponential rate. The use of medications in folk medicine has often been pragmatic rather than scientific. In particular, India has long been recognized as a source of high-quality medicinal herbs. The Indian Forest is the primary source of many essential oils and medicinal plants used in the pharmaceutical and fragrance industries. Medicinal plant treatment is often regarded as safe since it has no or very few adverse effects. The primary benefit of these treatments is their compatibility with nature. Herbal medicines have been used for thousands of years in India's traditional and complementary medicine practices, including Homoeopathy, Unani, Siddha, and Ayurveda. Ginger, Turmeric, Neem, Tulsi, Aloe, are only few examples of effective medicinal plants (Kashyap, 2015). The utilization of plant cell cultures has alleviated a number of drawbacks associated with the synthesis of secondary metabolites, which are used in the manufacture of medications, flavors, food additives, and other industrial products.(Ruby and Rana, 2015).

The species *Neolamarckia cadamba (Roxb.)* Bosser is part of the Rubiaceae family of plants. It is a tropical tree that originates from south and east Asia and

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has evergreen leaves. As the storey goes, Lord Krishna used to hang out under a Cadamb tree every chance he had. In addition to its decorative value, Neolamarckia is cultivated for its low-quality lumber and paper. Plywood, lightweight construction, paper and pulp, dugout canoes crates and boxes, , and furniture parts are just few of the many uses for this wood. The inner bark of the root is used to produce a bright yellow dye. (Prajapati and Kumar, 2007).Thus, *Neolamarckia cadamba* is a miraculous tree with different medicinal uses. These arises a need and therefore to screen N. cadamba for its bioactive compounds as a basis for further biomedical studies.

Material and Methods

Preparation of Plant Extract

The *Neolamarckia cadamba* has been gathered and then dried in the shade. A mixer grinder has been used to turn the dried plants into a powder. In order to have the extraction done, a Soxhlet apparatus was used. The extracts have been diluted to a concentration of 1mg/ml by dissolving them in an appropriate solvent. Appropriate dilution was used to create the extracts' working solutions.

Physico-Chemical Analysis

At Amala Ayurvedic Hospital in Thrissur, India, physico-chemical parameters including extractive values, acid insoluble ash, total ash, and moisture content were measured using Indian pharmacopoeia-standard techniques.

Phytochemical Analysis

To perform a typical phytochemical examination of the plant's main and secondary metabolites, the plant extract has been diluted with distilled water.**(**Kokate, 2001).

Total phenolic content

Total phenol content was calculated using Folin-ciocalteu reagent diluted to 1N in an equal amount of distilled water. Two millilitres of sodium carbonate were added to a 25 millilitre test tube containing one millilitre of the extract (1 milligramme per millilitre). For one full minute, the mixture was heated in a water bath at a rolling boil. Distilled water had been used to get the volume of the blue dye down to 25 ml. Labtronics NT290 Spectrophotometer was used to measure the transmittance % at 725nm. The standard curve for total phenol was established using catechol.(Bray and Thrope, 1954).

Results

Physico – Chemical Analysis

The powder characteristics of *Neolamarckia cadamba* were studied. Standard Pharmacopoeia procedure to determine different physicochemical parameters including water soluble ash, acid insoluble ash, total ash, were also determined at Amala Ayurvedic Hospital, Thrissur and is listed in the Table 1.

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Table 1: Powder characteristics of *Neolamarckia cadamba*

Sl No	Parameters	Result
1	Water soluble ash	2.67%
2	Acid insoluble ash	1.24%
3	Total ash	7.62%
4	Moisture content	6.89%
5	Taste	Bitter
6	Odour	Characteristic
7	Colour	Brownish

Phytochemical Analysis of Different Extracts of *Neolamarckia cadamba*

Preliminary phytochemical screening was done with different extracts of *Neolamarckia cadamba*. Extractions was carried out with petroleum ether, acetone and distilled water. In the preliminary screening, petroleum ether extract shows the presence of carbohydrates, sugar, fructose, protein, phenol, tannin and steroid. Acetone extract of *Neolamarckia cadamba* shows carbohydrate, sugar, fructose, protein, alkaloid, phenol, tannin, saponin and steroid. Distilled water extract of *Neolamarckia cadamba* shows the presence of carbohydrate, sugar, alkaloid, phenol, saponin, tannin and steroid (Table 2).

Table 2: Phytochemical Analysis of different Extracts of *Neolamarckia cadamba*

Phytochemical constituents	Test	Extracts		
		Petroleum Ether	Acetone	Distilled Water
Primary Metabolites				
Protein	Biuret	++	+	+
Starch	Iodine	-	-	-
Fructose	Seliwanoff	+	++	-
Sugar	Benedict	+++	+	+++
Carbohydrates	Molisch	+++	+++	+++
Secondary Metabolites				
Alkaloid	Mayer's Test	-	+	+
Phenol and Tannin	Ferric chloride Test	++	+++	+
Phenol	Folin Test	+	+++	++
Saponin	Foam Test	-	+	+
Steroid	Salkowski Reaction	+++	+++	+

+ means the concentration of the compound was measured.

- Absence of metabolite.

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Quantification of Phenol in Different Extracts of *Neolamarckia* cadamba

In the Folin- Ciocalteu spectrophotometric procedure, phenols are oxidised rapidly in the presence of alkali, often sodium carbonate, leading to a significant accumulation of the phenolate ions. To account for the fact that catechin is only one kind of polyphenol component, the total phenolic content of hot water extracts of spices was reported in terms of microgram (g) catechin equivalents (CE) µg of extract. Table 3 shows the total phenol content of several *Neolamarckia cadamba* preparations. The phenolic content in Petroleum ether is 10 CE/1µg and that of Acetone is 44 CE/1µg. Distilled water extract had the highest phenolic content 158 CE/1µg of extract using the standard curve of catechin (Table 3).

Table 3: The total amount of phenol present in different extracts of *Neolamarckia cadamba*

Sl No	*Neolamarckia cadamba* extract	Optical density	Average (µg/ µl)	Phenol concentration (µg/µl CE)
1	Petroleum ether	0.054 0.053 0.046	0.051	10
2	Acetone	0.223 0.211 0.236	0.223	44
3	Distilled water	0.719 0.841 0.828	0.796	158

Discussion

Plants have a crucial role in global health as a source of medication. It's common knowledge that some plants and herbs may provide useful medicinal properties. Today, the utilization of medicinal plants plays a pivotal part in every major healthcare system throughout the globe. Medicinal herbs are used not only for curing illness, but also as a possible resource for sustaining a healthy lifestyle.

In this present study, the phytochemical significance of the Neolamarckia cadamba leaf, as well as its anthelmintic characteristics, are investigated using a variety of extracts of the leaf, like distilled water acetone, and petroleum ether. Carbohydrates, sugar, proteins and are also present in all the extracts. Among secondary metabolites, steroids and tannins, saponin, phenol and alkaloids are present in all three extracts. According to phenol quantification, the distilled water extracts of *Neolamarckia cadamba* showed the highest phenolic content.

To this day, a number of different phytochemical substances were isolated from *Neolamarckia cadamba* utilizing various phytochemical research methods. The leaf extracts of *Neolamarckia cadamba* demonstrated the presence of a wide variety of secondary metabolites. These secondary metabolites include flavonoids, steroids, phenolic compounds,

tannins, alkaloids, and glycosides (Patel et al., 2012). Alkaloids such as cadambine as well as its derivatives are found in the bark, along with β-sitosterol, quinovic acid, cadambagic acid, triterpenoids, glycosides, and saponins (Kumar *et al*., 2010).

As a result, the findings of this research give a scientific foundation for its use in traditional medicine. Isolation and characterization of the active ingredients derived from the plant extracts are now being conducted at a variety of research sites across the world. The therapeutic qualities of the vast majority of medicinal plants are thought to originate from secondary metabolites including phenolics and alkaloids, which are typically generated by plants as part of their natural defensive systems. Therefore, the measurement of these metabolites will be helpful in the process of discovering novel and effective medications derived from plant sources, as well as in providing scientific validation for the traditional procedures that are now in use.

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