

COMPARATIVE STUDIES ON PHYTOCHEMICAL SCREENING OF FOUR DIFFERENT FLOWERS – *COUROUPITA GUIANENSIS*, *BAUHINIA PURPUREA*, *STENOLOBIUM STANS*, AND *PLUMERIA RUBRA*

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ABSTRACT

Objective: The present study aims to investigate the phytochemical from the aqueous and methanol flower extracts of four significant medicinal plants, namely, *Couroupita guianensis*, *Bauhinia purpurea*, *Stenolobium stans*, and *Plumeria rubra*.

Methods: The different flowers such as *C. guianensis*, *B. purpurea*, *P. rubra*, and *S. stans* were collected from Avadi and Koyambedu market, Chennai. Standard procedure was followed for the qualitative analysis of phytochemicals.

Results: Preliminary phytochemical analysis resulted that the methanolic flower extract of four plants has rich bioactive compounds comparably to the aqueous flower extracts. Tannins, saponins, flavonoids, terpenoids, and steroids were highly present in *B. purpurea* compared the other three flowers. Only plant *P. rubra* contains the rich source of cardiac glycosides in methanolic flower extract.

Conclusion: From the results of the current study, we conclude that the methanolic extract of *B. purpurea* flower has bulk phytochemicals and can be used as a traditional medicine to treat a variety of diseases.

Keywords: Secondary metabolites, Phytochemicals, Therapeutic, Pharmaceutical, Medicinal plants.

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INTRODUCTION

In ancient times, higher plants possess a rich source of medicinal compounds for human diseases [1]. Medicinal plants contain phytochemicals which protect from various diseases [2]. The usage of medicinal plants in the system of medicine, i.e. Ayurveda, Siddha, and Unani is well known [3]. Based on utilization of flowering plants are reported to have plenty of secondary metabolites [4]. Secondary metabolites are called phytochemicals, biologically active compounds to protect from diseases [5]. Plants have given rise to some important drugs which are in use today, and it provides daily needs such as food and shelter for man [6]. *Couroupita guianensis* belongs to Lecythiaceae family; it is native to Northern South America and Southern Caribbean, and India. This plant is used for drug preparation to cure bleeding piles, dysentery, scorpion poison, and gastritis [7]. *C. guianensis* flower is used to treat hypertension, tumors, skin diseases, wound, cold, stomach ache, and malaria. Various parts of the tree have been reported to contain volatile oils, ketosteroids, glycosides, couroupitane, indirubin, isatin, and phenolic substances [8]. *Bauhinia purpurea* belongs to Fabaceae family, consists of 15 species all over India [9]. The different parts of the plant used to treat blackness of lip or tongue, convulsion, thigh swelling, and rheumatism [10-13]. *Stenolobium stans* called as *Tecoma stans*, yellow bells and Ginger Thomas belong to Bignoniaceae family. *S. stans* flower is used as a treatment for stomach pains, diabetes, and digestive problems [14]. It has antidiabetic, anticancer, antioxidant, antimicrobial, and antifungal properties. These plants are fast-growing with 20–30 ft in height, having a moderate growth, and yellow flowers. Fruits are elongated and clustered. The plant is in use through Mexico, India, and Central America for diabetes, roots for diuretic and urinary disorder control [15]. *Plumeria rubra* is also called red frangipani, temple tree belongs to Apocynaceae family. This plant is native to Mexico and used to treat diabetes mellitus. It has now been established that the plants synthesize and accumulate some secondary metabolites such as alkaloids, glycosides, tannin, and volatile oil. *P. rubra*

leaves are still used as a treatment for ulcers, leprosy, and inflammations [16]. The essential oil from the *P. rubra* flowers is used for perfumery and aromatherapy purposes [17].

The present study aims to comparatively analyze various important phytochemicals present in the flower extracts of four selected medicinal plants, prepared as aqueous extract and methanol extract separately.

METHODS

Collection of flowers

The different flowers such as *C. guianensis*, *B. purpurea*, *P. rubra*, and *S. stans* were collected from Avadi and Koyambedu market, Chennai.

Preparation of flower extract

After the collection of flowers, it was washed with double distilled water and shade dried to evaporate the water molecules present in it. The dried flowers were ground into a fine powder and preserved in an air-sealed polythene cover for further evaluation.

Preparation of aqueous extract and crude alcohol

10 g of four different powdered flower samples was taken in eight different containers, and 100 ml of water and ethanol has been added in every four individual containers. The sample was held for 24 h, filtered through Whatman filter paper, and dried.

Phytochemical screening of flower extract

The methanol and aqueous flower extract solutions were analyzed for the presence of the phytochemical analysis by the following standard procedure [18-20].

Test for tannins

0.4 ml of flower extract was dissolved in ferric chloride. A solution was changed to dark green color; it indicates the presence of tannins.

Table 1: Comparative analysis of phytochemicals in the aqueous flower extract of *Couroupita guianensis*, *Bauhinia purpurea*, *Plumeria rubra*, and *Stenolobium stans*

Name of the test	<i>Couroupita guianensis</i> flower extract	<i>Bauhinia purpurea</i> flower extract	<i>Plumeria rubra</i> flower extract	<i>Stenolobium stans</i> flower extract
Test for tannins	+	++	+	+
Test for saponins	++	+	-	++
Test for flavonoids	+	+	+	+
Test for terpenoids	+	+	-	-
Test for steroids	-	-	-	-
Test for cardiac glycosides	-	-	-	-

+: Present, ++: Present in bulk, -: Absent

Table 2: Comparative analysis of phytochemicals in the methanol flower extract of *Couroupita guianensis*, *Bauhinia purpurea*, *Plumeria rubra*, and *Stenolobium stans*

Name of the test	<i>Couroupita guianensis</i> flower extract	<i>Bauhinia purpurea</i> flower extract	<i>Plumeria rubra</i> flower extract	<i>Stenolobium stans</i> flower extract
Test for tannins	+	++	+	+
Test for saponins	++	+	-	++
Test for flavonoids	+	+	+	+
Test for terpenoids	-	+	-	+
Test for steroids	+	+	-	+
Test for cardiac glycosides	-	-	+	-

+: Present, ++: Present in bulk, -: Absent

Test for cardiac glycosides

0.4 ml of flower extract was mixed in 2 ml glacial acetic acid with one drop of 1% ferric chloride (FeCl₃). A brown ring was formed between the layers; it indicates the presence of cardiac glycosides.

Test for saponins

0.4 ml of flower extract was mixed with 5 ml of distilled water. The appearance of foam indicates the presence of saponins.

Test for flavonoids

NaOH and HCL were added in 0.4 ml of flower extract. The yellow color solution changed to colorless, it indicates the presence of flavonoids.

Test for steroids

0.4 ml of flower extract taken up 2 ml of acetic anhydride and 2 ml of H₂SO₄. The color of the samples will change from violet to blue or green, indicating the presence of steroids.

Test for terpenoids

0.4 ml of flower extract was taken with 2 ml of chloroform and 5 ml of concentrated sulfuric acid was carefully added at the sides to form a layer. A reddish-brown color interface has appeared; it indicates the presence of terpenoid.

RESULTS AND DISCUSSION

In the present investigation, the aqueous and methanol extracts of different flowers such as *C. guianensis*, *B. purpurea*, *S. stans*, and *P. rubra* results in the presence of bioactive compounds and some are absent as well. The results of aqueous extract are shown in Table 1 and methanol flower extract shown in Table 2.

Methanol flower extracts show the bulk of phytochemicals compared to aqueous flower extract. Tannins, saponins, flavonoids, terpenoids, and steroids were present as the rich source in methanol extract of *B. purpurea* and *S. stans*. Cardiac glycosides were detected in methanol extract of *P. rubra* and it shows as negative in other three methanol and aqueous flower extracts. Tannins and flavonoids are detected in both methanol and aqueous flower extracts. *C. guianensis* contains a bulk form of saponins and indicates as absence in *P. rubra*. In four different aqueous flower extracts, phytochemicals such as tannin, flavonoids,

and saponins are richly present, but it was weak in steroids and cardiac glycosides. Flavonoids will be easily absorbed into the cell membrane and protect the cells from damage [21]. Different phytochemicals are helped to treat the diseases, in the presence of alkaloids, it contains antitumor and anti-inflammatory [22]. Flavonoids will modify the natural biological reaction and to treat anticancer, antimicrobial, and anti-allergic activities [23]. "Tannins" contain both fungicidal and bactericidal activities [24]; saponins have hypercholesterolemia and antimicrobial properties and mostly responsible for the central nervous system [25]. Cardiac glycoside properties are attributed to pharmacological activity.

CONCLUSION

Qualitative phytochemical analysis of flower extracts indicates the rich source of bioactive compounds present in the medicinal plants. From the current study, the phytochemical composition of methanol extracts shows bulk nature of phytochemicals comparably to aqueous flower extracts. In that methanol extract, *B. purpurea* shows the rich phytochemicals compare to the *C. guianensis*, *S. stans*, and *P. rubra*.

AUTHORS' CONTRIBUTIONS

Sai Nandhini has generated the idea and done the work completely and has compiled the whole manuscript; Nirmala Nithya checked the file while drafting the manuscript and provided all full-text literature.

CONFLICTS OF INTEREST

The authors declared that they do not have any conflicts of interest.

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