Evaluation of Solvent-Dependent Phytochemical Variation in *Plectranthus mollis* (Aiton) Spreng. and *Colebrookea oppositifolia* Sm.

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Article DOI Link: https://zenodo.org/uploads/19667414

DOI: 10.5281/zenodo.19667414

Abstract

Phytochemistry deals with the study of the chemical constituents present in plant parts many of which exhibit significant medicinal properties. The family Lamiaceae is particularly rich in phenolic compounds and terpenoids. Members of this family possess notable antimicrobial, antioxidant, anti-inflammatory, and cardioprotective activities, making them valuable sources of natural alternatives to synthetic therapeutic agents. Identification of biologically active compounds begins with phytochemical screening of plant materials. In the present work, qualitative phytochemical analysis was on *Plectranthus mollis* (Aiton) Spreng. and *Colebrookea oppositifolia* Sm., were screened using five different solvents to identify the most suitable solvent for the extraction for further study in which ethanol and acetone show best solubility.

Keywords: Phytochemicals, Solvent, Extraction, Lamiaceae, *Plectranthus mollis* (Aiton) Spreng. and *Colebrookea oppositifolia* Sm.,

Introduction

Plants contain numerous medicinally active chemical compounds known as phytoconstituents or phytochemicals, which also protect plants against microbial infestations. Major bioactive compounds include alkaloids, flavonoids, phenols, triterpenoids, glycosides, essential oils, and other secondary metabolites that contribute to plant physiological activities. In addition, primary metabolites such as carbohydrates, proteins, and lipids serve as food for humans (Kokate et al., 2002). A comprehensive study of crude drugs should therefore include both primary and secondary metabolites (Sofawora, 1982). The family Lamiaceae is rich in phenolic compounds and terpenoids with antimicrobial, antioxidant, anti-inflammatory, and antitumor properties. In this study, qualitative phytochemical screening of Plectranthus mollis and Colebrookea oppositifolia was conducted using petroleum ether, acetone, ethanol, chloroform, and water to evaluate

solvent polarity and select suitable solvents for antioxidant compound isolation (Azzahra et al., 2026).

Material and Methods

The plants under study were collected, identified and then extract was prepared for further phytochemical analysis.

Collection of Plant Material

The selected plants were *Plectranthus mollis* (Aiton) Spreng., *Colebrookea oppositifolia* Sm. Plants were collected from different localities of Ahmednagar District, Maharashtra and identified from Botanical Survey of India, Western Circle, Pune.

Preparation of Plant Extract

The dried leaves were powdered by using grinder and used for extraction in different solvents as petroleum ether, chloroform, acetone, ethanol and water according to the polarity, by using Soxhelet apparatus. Crude extracts were collected and preserved for further experiment at 4^0C.

Preliminary Phytochemical Analysis

The phytochemical analysis of the extracts was tested for different phytochemicals present in leaves of selected plants by using standard procedures of Harbone (1973) and Trease Evans (2010).

- **Test for Carbohydrates (Molisch's Test):** In each 1 ml of plant extract, 3-5 drops of Molisch's reagent was added then 1ml concentrated H_2SO_4. Violet ring formation shows the presence of carbohydrates.
- **Test for Alkaloids (Wagner's Test):** Here test 1 ml of each plant extract was taken in test tube and acidified with 1.5% HCl. Then added of 3-5 drops of Wagner's reagent. Reddish brown precipitation indicates the presence of alkaloids.
- **Test for Flavonoids (Alkaline Reagent Test):** It is done with 1 ml sample of extract and 3-5 drops of 20% NaOH. Formation of yellow colour was appeared, becomes colorless after addition of 0.5 ml dilute HCl shows the presence of flavonoids.
- **Test for Phenol (Ferric Chloride Test):** The test is performed addition of $FeCl_3$ solution in 1 ml of each extract, deep blue colour developed. It indicated presence of phenol.
- **Test for Glycosides (Keller Kelliani Test):** 1 ml of each extract and 1 ml of glacial acetic acid mixed and 2-3 drops solution of $FeCl_3$ added. 0.5ml of concentrated H2SO4 added in it. Development of brown ring at the junction of two liquids confirms the presence of glycosides.
- **Test for Terpenoids (Salkowski Test):** In this test 1 ml of each plant extract

was treated with chloroform and conc. H_2SO_4 was added 3-5 drops of to it. Formation of reddish-brown precipitation seen at inner face conforms the presence of terpenoids.

- **Test for Saponins (Foam Test):** Here, 1 ml of each sample was mixed with 5 ml of water taken in the test tube and shaken vigorously, foam seen for 10-15 minutes, indicated the presence of saponins.
- **Test for Amino Acids and Proteins:** 2-3 drop of ninhydrin solution was added in each extract and kept in water bath for 1-2 minutes. Development of purple color indicates the presence of amino acids and proteins.
- **Test for Steroids (Salkowski Test)** 1ml of extract, was added in chloroform and followed by 3-5 drops of conc. H_2SO_4. Red color seen, indicated the presence of steroids.
- **Test for Quinones:** By adding 1 ml of each extract with 0.5 ml of conc. HCl, yellow precipitation appeared, it indicates presence of quinones.
- **Test for Resin:** 1 ml of extract was added in 5 ml water, the solution becomes turbid, indicating presence of resins.
- **Test for Coumarin:** During the test 1 ml of each sample was treated with 1.5 ml of 10% NaOH, yellow colour detected, confirms presence of coumarin.

Results and Discussion

The phytochemical profiling considers thirteen major phytochemicals like carbohydrate, alkaloids, phenolic compounds, tannins, glycosides, terpenoids, saponins, quinones, resin, coumarins and others which helps in understanding and linking various biological properties of these plants.

***Plectranthus mollis* (Aiton) Spreng**.

Ethanolic and acetone extracts showed highest phytochemical diversity. Ethanol contained carbohydrates, alkaloids, flavonoids, phenolics, saponins, glycosides, proteins, and terpenoids, while acetone showed similar compounds with coumarins and quinones. Aqueous extract was moderate, petroleum ether limited, and chloroform least compatible. Results agree with Ramu et al. (2012) and Gunavathy and Sherin (2019).

Table 1: Phytochemical analysis of Plectranthus mollis (Aiton) Spreng.* and *Colebrookea oppositifolia S

SN	Plant Name	*Plectranthus mollis*					*Colebrookea oppositifolia*				
	Phytochemical	**PE**	**CH**	**AC**	**ET**	**AQ**	**PE**	**CH**	**AC**	**ET**	**AQ**
1.	Carbohydrates	-	-	+	+	+	+	+	-	+	+
2.	Alkaloids	+	+	+	+	-	+	+	+	+	+
3.	Flavonoids	-	+	+	+	+	-	-	+	+	+
4.	Phenolics	+	+	+	+	+	-	-	+	+	+
5.	Glycosides	+	+	+	+	+	+	+	+	+	+

6.	Terpenoids	-	-	+	+	+	+	+	+	+	+
7.	Saponins	+	-	-	+	-	+	+	-	+	+
8.	Amino acids and proteins	+	-	+	+	-	-	-	-	+	+
9.	Steroids	-	-	-	-	-	-	-	-	-	-
10.	Quinones	-	-	+	-	-	+	-	+	-	-
11.	Resins	-	-	-	-	+	-	-	-	-	-
12.	Coumarins	+	-	+	-	-	+	+	-	+	+

+ Present, - Absent, PE - Petroleum Ether, CH - Chloroform, AC - Acetone, ET - Ethanol, WR - Water.

***Colebrookea oppositifolia* Sm.**

Ethanolic and aqueous extracts yielded maximum phytochemicals, including carbohydrates, alkaloids, phenolics, flavonoids, glycosides, saponins, terpenoids, proteins, and coumarins, indicating suitability for extracting compounds from *Colebrookea oppositifolia*. Acetone showed most constituents except alkaloids, saponins, and coumarins. Petroleum ether and chloroform contained fewer compounds. These findings agree with Sardar and Manik (2017) and Madhavan et al. (2011).

Conclusion

Twelve phytochemicals were detected in the studied plant extracts, while steroids were absent in both species. Among the solvents, ethanol proved most effective for phytochemical extraction, followed by water. Petroleum ether showed the least number of phytochemicals compared to other solvents.

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