

Solvent Solubility Assessment by Using Phytochemical Screening of Some Lamiaceae Members

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ABSTRACT

Members of family Lamiaceae produce a wide array of aromatic compounds and they have been used for a number of medicinal purposes. The present study was aimed to screen some members of family Lamiaceae for their phytochemical constituents for better understanding of their solvent solubility. The qualitative phytochemical screening was performed in terms of Alkaloids, Amino acids, Carbohydrates, Flavonoids, Glycosides, Lipids, Phenols, Saponins, Steroids and Quinines. All studied species viz. *Mentha arvensis*, *Ocimum sanctum* and *Coleus forskohlii* shows negative response to Alkaloids, Steroids and Glycoside tests which proves their role in food except *Salvia officinalis*. According to results and available literature the presence of Tannins, Phenols and Flavonoids indicates medicinal properties of members of Lamiaceae and have maximum phytochemicals found soluble in organic solvents. These studies will provides referential information for the correct identification of crude drug.

Keywords: Lamiaceae, Aromatic Compounds, Solvent Solubility, Qualitative Phytochemical Screening

I. INTRODUCTION

In many developing countries including India most of the population, mainly in rural areas, depends on tribal and traditional medicines for their primary healthcare. The Indian indigenous knowledge of medicinal plants has been well documented in Ayurveda and considers all plants to be potential sources of medicinal bioactive compounds. India is considered as one of the mega biodiverse country where the use of herbals for disease control is a part of tradition and even routine practice today (1).

Today everyone is interested in Ayurvedic or herbal drugs. This interest mainly comes from the belief that Ayurvedic or herbal medicines are safe, inexpensive and without side effects.(2)

Proximate phytochemical analysis in plants provides valuable information and help to access the quality of the sample. The future development of Herbal drug industry would be largely dependent on the reliable methodologies for identification of bioactive compounds of the extracts and also upon the standardization and quality control of the extracts. (3)

Medicinally active compounds are separated from plant tissues using selective solvents through standard procedures of extraction. Standardization problems arise from the complex composition of drugs which are used in the form of whole plant, plant parts and plant extracts. Here in the present study we used four different solvents viz. acetone, alcohol, chloroform and Distilled water to know superior solubility of solvent for phytochemical screening. For this study we have selected some common species of family Lamiaceae viz. *Mentha arvensis*, *Salvia officinalis*, *Ocimum sanctum* and *Coleus forskohlii*.

These plants were screened for their active medicinal ingredients. Family Lamiaceae comprises with 236 genera and more than 7000 species, the largest family of order Lamiales. Lamiaceae is distributed nearly worldwide, and many species are cultivated for their fragrant leaves and attractive flowers. The family is particularly important to humans for herb plants useful for flavor, fragrance or medicinal properties.(4)

Mentha arvensis used as medicine to treat bronchitis, cholera, weakness of stomach, nausea, vomiting, diarrhea, pyrexias, cough and asthma along with

analgesic, expectorant, anthelmintic, antiseptic and antispasmodic activities.(5)

Salvia officinalis have been used worldwide as flavoring species as well as traditional herbal medicine.(6) Tea of *Salvia* leaves has been used for treatment of digestive and circulation disturbances, bronchitis, cough, asthma, angina, mouth and throat inflammation, excessive sweating, skin diseases etc.(7) *Salvia* oil has been shown to have carminative, antispasmodic, antiseptic and astringent properties.(8)

In *Ocimum sanctum* another plant from Lamiaceae is already studied for its phytochemical constituents by Singh *et al.* (9) Different parts (leaves, stem, flower, root, seeds and even whole plant) of *Ocimum sanctum* has been used for the treatment of Bronchitis, bronchial asthma, malaria, diarrhea, dysentery, skin diseases, arthritis, painful eye diseases, chronic fever, insect bite etc. *O. sanctum* has also been suggested to possess antidiabetic, anticancer, antifertility, hepatoprotective, cardioprotective, analgesic, antispasmodic and antimicrobial actions.(10)

Last species under study *Coleus forskohlii* is also from Lamiaceae family, root part has been used since ancient times to treat heart disorders such as high blood pressure (hypertension) and chest pain (angina), weight loss, as well as respiratory disorders such as asthma. (11) Although all these plants are already studied we have also selected these for screening of perfect solvent to dissolve phytochemicals. In Western Ghats of India

these plants grow as weeds hence large quantity of biomass is available for study.

II. METHODS AND MATERIAL

The fresh plant material was collected in the month of July 2017 from Wansda National Park, Gujrat and Chirai Ghat of Sargana Tehsil of Nashik District of Western Ghats of India. The plants were identified and authenticated by Department of Botany, Savitribai Phule Pune University, Pune, India. The fresh leaves of *Mentha arvensis*, *Salvia officinalis*, *Ocimum sanctum* and *Coleus forskohlii* were washed with distilled water and cut into small pieces. These materials were subjected for extractions in different solvents such as Acetone, Alcohol, Chloroform and Distilled water.

Preparation of Extracts

Fresh leaves were subjected to acetone, alcohol, chloroform and aqueous extraction by Soxhlet extractor. 5 gm of each studied Lamiaceae member were used for Soxhlet extraction. The clear filtrates were obtained and used for further studies.

Qualitative Phytochemical Screening

Qualitative phytochemical screening for the presence of various compounds by standard methods.(12-16)

Table 1. Assessment of solvent solubility by using preliminary phytochemical screening of some members of family Lamiaceae

Test Conducted		<i>Mentha arvensis</i>				<i>Salvia officinalis</i>				<i>Ocimum sanctum</i>				<i>Coleus forskohlii</i>			
		Acet one	Alco hol	Chloro form	D W	Acet one	Alco hol	Chloro form	D W	Acet one	Alco hol	Chloro form	D W	Acet one	Alco hol	Chloro form	D W
Alkaloids	Dragendorff's Reagent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wagners Reagent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tannin by 1% lead acetate		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Tannin by FeCl ₃ and KOH		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Protein		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flavonoid		+	+	+	-	+	+	+	-	+	+	+	-	+	+	+	-
Phenol		+	+	+	-	+	+	+	-	+	+	+	-	+	+	+	-
Steroid		-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-

Saponins		-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Quinine		-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Glycoside		-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-
Carbohydrates	Benedict's Reagent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Fehling's Test	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Amino acid		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

III. RESULTS AND DISCUSSION

Water is universal solvent which mostly used to extract plant bioactive compounds. Many traditional users use mostly water for extraction but most of the plant extracts in organic solvents have been found to give more consistent medicinal properties as compared to water extract. Same kind of results were observed through current study which proves most of the phytochemicals are soluble in organic solvents rather than water. The results revealed that the tannins were present in almost all four extracts of members of Lamiaceae under study while Flavonoid and Phenols were soluble and present only in organic solvents such as Acetone, Alcohol and Chloroform. The Amino acids, Proteins and Alkaloids were totally absent in all four members of Lamiaceae under investigation. Saponins and Quinines are present and soluble in water extracts of *Mentha arvensis* and totally insoluble and absent in *Salvia officinalis*, *Ocimum sanctum* and *Coleus forskohlii*. Steroids and Glycosides were found soluble and detected in organic solvent extracts of *Salvia officinalis* while absent in other members. When compared all studied species of Lamiaceae family for their extraction it is found that *Mentha arvensis* contains higher water soluble bioactive compounds. Similar kind of results were observed in case of Acetone, Alcohol and Chloroform extracts of these plants. *Salvia officinalis* shows maximum solubility of phytochemicals than other studied species. The observations are depicted in given Table 1 which shows the results of the phytochemical screening of various extracts of *Mentha arvensis*, *Salvia officinalis*, *Ocimum sanctum* and *Coleus forskohlii*.

Such preliminary phytochemical screening is helpful in prediction of nature of drugs and also for detection of different bioactive constituents in different polarity solvents. This study may be helpful to isolate and characterize the chemical constituents present in those

plant extracts which would be helpful in discovering the actual value of ethno medicines.

IV. CONCLUSION

Standardization is essential measure for quality, purity and sample identification. It is confirmed from the results and literature available presence of phenols and flavonoids indicates their medicinal usefulness of these plants. It can be concluded from results that in case of Lamiaceae members that maximum phytochemicals are soluble in organic solvents. Acetone and Chloroform are the best solvents for phytochemical screening and helps in formulating pharmacopeia standards.

Further investigations will lead to the antioxidant, elemental, HPLC analysis and antimicrobial susceptibility testing against purified bioactive compounds isolated.

V. REFERENCES

- [1]. Shankar D, Ved DK. A balance perspective for management of Indian medicinal plants. Indian Forester, 2003; 129(2): 275-288.
- [2]. K Kaur, AK Gupta, S Ahmad, P Alam. Pharmacognostic, Phytochemical and Physicochemical Studies of *Mimusops elengi* Linn. Stem bark (Sapotaceae). International Journal of Research in Pharmaceutical and Biomedical Sciences, 2011, 2(4), 1670-1677.
- [3]. Prasad Sk, Singh PN, Wahi AK, Hemalatha S. Pharmacognostical Standardization of *Withania coagulans* Dunal. Pharmacognosy Journal, 2 (11), 2010, 386-394.
- [4]. Alankar S. A review on Peppermint Oil . Asian Journal Pharmaceutical and Clinical Research. 2009; 2(2): 27-33.
- [5]. Saleem MN and Idris M. Podina (*Mentha arvensis*) : Transformation from Food Additive to

- Multifunctional Medicine. ARC Journal of Pharmaceutical Sciences; 2016; 2(2):06-15.
- [6]. Ayatollahi A, Shojaii A, Kaobarfard F, Mohammadzadeh M, Choudhary M. Two flavones from *Salvia leriifolia*. Iran Journal of Pharmaceutical Research, 2009; 8: 179-184.
- [7]. Rami K, Li Z. Antimicrobial activity of essential oil of *Salvia officinalis* L. collected in Syria. African Journal of Biotechnology, 2001; 10: 8397-8402.
- [8]. Loizzo MR, Tundis R, Menichini F, Saab AM, Statti GA, Menichini F. Cytotoxic activity of essential oils from Labiatae and Lauraceae families against in vitro human tumor models. Anticancer Research. 2007; 27: 3293-3299.
- [9]. Singh AR, Bajaj VK, Sekhawat PS, Singh K. Phytochemical estimation and Antimicrobial activity of Aqueous and methanolic extract of *Ocimum sanctum* L. Journal of Natural Products and Plant Resources, 2013; 3(10): 51-58.
- [10]. Pattanayak P, Behera P, Das D, Panda SK. *Ocimum sanctum* Linn. A reservoir plant for therapeutic applications: An Overview. Pharmacognosy Review, 2010; 4(7): 95-105.
- [11]. Kavitha C, Rajaramani K, Vadivel E. *Coleus forskohlii* : A comprehensive review on morphology, phytochemistry and pharmacological aspects. Journal of Medicinal Plant Research, 2010; 4(4): 278-285.
- [12]. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy 21th ed, Nirali Prakashan. Pune, 2002, 111-112.
- [13]. Indian Pharmacopoeia, Ministry Of Health & family welfare. Govt of India. Controller of publications, New Delhi, VOL II, 1996, A 53-54.
- [14]. Dr. Pullok KM. Quality control of herbal drug, 21st ed, 2007, 187-191, 519-520, 529.
- [15]. Kokate CK, Purohit AP, Gokhale SB. Practical Pharmacognosy 4th ed, 2000, Vallabh Prakashan, 107-111,123- 125,130.
- [16]. Kandelwal KR, PAWAR AP, Kokate CK, Gokhale SB. Practical Pharmacognosy technique & experiments, 3 rd ed, Nirali Prakashan, 1996, 2-4.