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Pharmacognostical, Phytochemical Evaluation of Kokilakshakam Kashayam: A classical herbal formulation

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Abstract

Ayurveda, a holistic healing system, uses medicinal formulations like *Kokilakshakam Kashayam* to treat conditions such as *Vatarakta* (gout), characterized by excessive uric acid accumulation in joints. This Ayurvedic decoction combines *Hygrophila auriculata* (Kokilaksha) and *Tinospora cordifolia* (Guduchi), both known for their anti-inflammatory, detoxifying, and rejuvenating properties. Despite its traditional use, scientific documentation of its pharmacognostic, phytochemical, and pharmacological profiles is limited. This study aimed to evaluate the raw materials, preparation process, and therapeutic properties of Kokilakshakam *Kashayam*. The raw materials were sourced from Sitaram Ayurveda Pvt. Ltd. and authenticated through pharmacognostic analysis. The formulation was prepared according to traditional methods outlined in *Sarangadhara Samhita*. Physicochemical analysis of the *Kashayam* showed parameters like pH, specific gravity and total soluble solids. Preliminary phytochemical tests revealed bioactive compounds including terpenoids, flavonoids, alkaloids, and saponins. Thin Layer Chromatography (TLC) fingerprinting confirmed the presence of several therapeutic compounds. These findings support the traditional use of *Kokilakshakam Kashayam* for its anti-inflammatory, antioxidant, and antimicrobial effects, suggesting its potential to reduce inflammation, improve metabolic functions, and promote overall health. This study provides scientific validation for *Kokilakshakam Kashayam*, contributing to its standardization as a therapeutic option for managing gout and related inflammatory conditions. Further clinical research is recommended to explore its long-term efficacy and integration into modern medicine.

Keywords: *Kokilakshakam Kashayam*; *Kokilaksha*; *Guduchi*; Gout; Phytochemicals; Ayurvedic Medicine; Inflammation, Diuretic

1. Introduction

Ayurveda emphasizes natural healing practices, including the use of herbs, dietary recommendations, physical activity, meditation, and lifestyle modifications[1]. The entire science of Ayurveda has been framed upon *trisutras- Hethu, linga* and *oushadha*. Among them, *oushadha* (medicine) is the most important. Bhaishajya kalpana is the branch of Ayurveda, which primarily deals with the different kinds of dosage forms and their therapeutic utility[2]. The term comprises two words- *bhaishajya* and *kalpana*. Any substance can be called as bheshaja if it can mitigate the severity of disease. It is also called as oushadham – means a substance having the capability to alleviate pain. Kalpana means the process or modification through which a substance is transformed into medicinal form[3]. Pancha Vidha Kashaya Kalpanas are fundamental formulations in Ayurveda that focus on the preparation of herbal decoctions, each having unique therapeutic properties. The term "Pancha Vidha" refers to the five different methods of preparation, which are Kalka

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Kashaya, Kwatha Kashaya, Phanta Kashaya, Churna Kashaya, Swarasa Kashaya. Each of these preparations is designed to harness the therapeutic properties of herbs in a way that best suits the nature of the disease and the individual constitution of the patient. The use of these formulations in Ayurveda is crucial for maintaining health and treating various diseases in a natural and holistic manner.[4]

Kokilakshakam Kashayam is an Ayurvedic decoction formulated to treat *Vatarakta* (gout) a condition characterized by excessive uric acid accumulation in the joints, causing inflammation, pain, and stiffness.[5]The formulation includes two key ingredients: *Kokilaksha* (*Hygrophila auriculata*) and *Guduchi* (*Tinospora cordifolia*), which are herbs that used abundantly in Ayurvedic medicine for their anti-inflammatory, detoxifying, and rejuvenating properties .[6] The combination of *Kokilaksha* and *Guduchi* in this formulation aids in reducing inflammation, promoting detoxification, and alleviating pain. The diuretic and anti-inflammatory properties of the two herbs help in managing hyperuricemia, improving circulation, and reducing symptoms of arthritis.[7,8]

The formulation also supports liver and renal functions, stimulates metabolism, and boosts immune response.[6] Regular use can aid in reducing oxidative stress and inflammatory markers, making it a holistic approach to managing chronic conditions like gout. It is believed to possess therapeutic benefits owing to its carefully chosen medicinal plant ingredients, each selected for its bioactive properties. Despite its long-standing use, there remains a gap in the scientific documentation of its pharmacognostic, phytochemical, and pharmacological profiles. This study is designed to bridge this gap by evaluating the pharmacognostic properties, phytochemical constituents, and exploring the potential therapeutic effects of *Kokilakshakam Kashayam.*

2. Materials and Methods

2.1. Collection of Raw material

The raw materials were obtained from the raw material store of Sitaram Ayurveda Pvt. Ltd., Thrissur, and were identified and authenticated at the Pharmacognosy Division. Specimen samples were then stored in the Quality Control Division of Sitaram Ayurveda Pvt. Ltd. With the specimen number of *Hygrophila auriculata* and *Tinospora cordifolia* as SAPL/QC/CS/027, SAPL/QC/CS/215 respectively. The ingredients and the parts used in the preparation of the Kashaya are detailed in Table no:1.

2.2. Preparation of Kashayam

Kokilakshakam Kashayam was prepared according to the ratio specified in Table-1 as per the book *Sarangadhara samhita* at the production division of Sitaram Ayurveda Pvt. Ltd.[9] Both the herbs were thoroughly washed, dried, and broken down, 48 grams (one pala) of the disintegrated herbs were combined with 768 ml of water (16 parts) and added in an earthen pot over a gentle fire until the volume was reduced to 96 ml, which is one-eighth of the original amount.

Table 1 List of Herbal raw materials of *Kokilakshakam kashayam*

Sl.No	Sanskrit Name	Botanical Name	Part used	Ratio
1	*Kokilaksha*	*Hygrophila auriculata*	Whole plant	1 Part
2	*Guduchi*	*Tinospora cordifolia*	Stem	1 Part

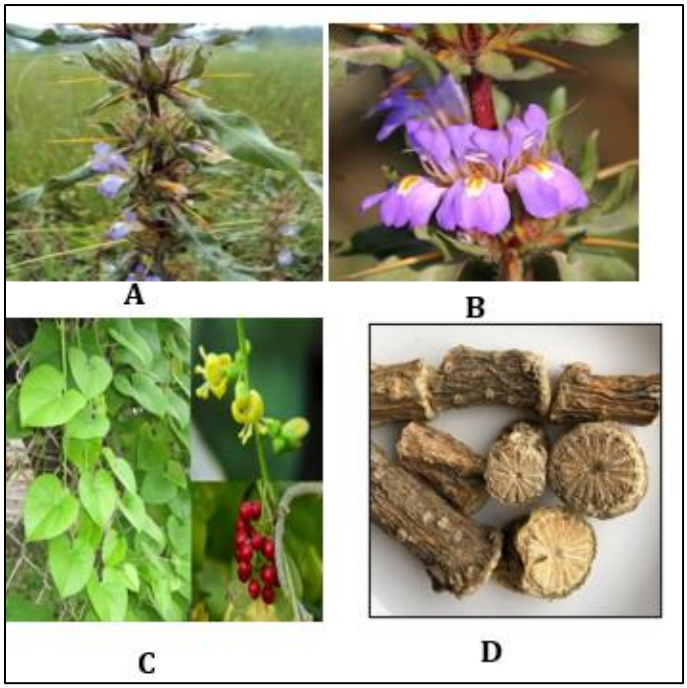

Figure 1 A : *Kokilaksha* -Whole Plant, B: *Kokilaksha* Flower, C: *Guduchi* –Whole plant, D: *Guduchi* -Stem

2.3. Properties and Physicochemical Analysis of Raw Materials

Physicochemical analysis, including tests for Total Ash, Acid Insoluble Ash, Water Soluble Extractive, and Alcohol Soluble Extractives, of the raw materials was conducted and *Rasa, Guna, Virya, Vipaka*, and *Karma* properties of both raw materials were analyzed by the standard procedures outlined in the Ayurveda Pharmacopeia of India.[10]

2.4. Organoleptic and Physicochemical Assessment of Kashayam

The organoleptic properties provide an overall indication of the authenticity of the kashayam. Ayurveda Parameters such as colour, odour, and taste, along with primary physicochemical characteristics like pH, specific gravity, and total soluble solids, were analyzed.[11]

2.5. Preliminary Phytochemical Analysis

The presence or absence of preliminary phytochemical constituents such as carbohydrates, sugars, reducing sugars, ketones, amino acids, proteins, starch, quinones, glycosides, flavonoids, phenols, saponins, alkaloids, tannins, and coumarins in *Kokilakshakam Kashayam* were assessed.[10]

2.6. Thin Layer Chromatography (TLC) Fingerprint Analysis

Thin Layer Chromatographic (TLC) fingerprint analysis was performed to separate the bands. A 20 ml sample was refluxed with 40 ml of methanol for 1 hour, then filtered and completely evaporated using a water bath. The remaining residue was dissolved in 1 ml of methanol. TLC was conducted by uniformly coating clean glass plates (10 x 5 cm) with a slurry of silica gel G using a commercial spreader. The methanol extract of the sample drug was applied to the silica gel surface with a fine capillary tube, positioned 2 cm above the lower edge of the plate, and allowed to dry. The plate was then placed carefully at a 45-degree angle in the development chamber, with the capillary spot above the solvent level. The plate was developed using a mobile phase of Toluene and Ethyl acetate (9:1)**.** After development, the plate was visualized under UV light at 254 and 366 nm.[10]

3. Results and Discussion

3.1. Properties and Physicochemical Analysis of Raw Materials.

The Properties and action of the raw materials is presented in Table-2

In Ayurveda, comprehending the *Rasa, Guna, Virya, Vipaka*, and *Karma* properties of a substance is vital for assessing its therapeutic value and correct application in treatment. Together, these five qualities, often referred to as the *Panchabhuta*, serve as the basis for the clinical use of herbs, minerals, and other natural substances in Ayurveda practices.

Table 2 Properties and action of Raw Materials[11]

Sl No.	Parameters	*Hygrophila auriculata*	*Tinospora cordifolia*
1	*Rasa*	*Madhura, Amla, Tikta*	*Tikta, Kasaya*
2.	*Guna*	*Picchila, snigdha*	*Laghu,*
3	*Virya*	*Sita*	*Usna*
4	*Vipaka*	*Madhura*	*Madhura*
5	*Karma*	*Balya, Vrsya, mutrala, vajikara, santarpana, Rucya*	*Tridosasamaka, Samgrhi, Balya, Dipana, Rasayana, Raktasodhaka, Jvaraghna*

Physicochemical analysis of Raw materials are tabulated in table No 3

Table 3 Physicochemical Analysis of Raw Materials

Sl No.	Raw Materials	Total Ash	Acid Insoluble Ash	Water Sol. Extractives	Alcohol Sol. Extractives
1	*Hygrophila auriculata*	6.82%	1.86%	7.30%	4.5%
2.	*Tinospora cordifolia*	7.62%	1.88%	11.56%	4.0%

Physicochemical parameters are crucial for detecting adulterants and improper handling of drugs. Ash values serve as an important quantitative standards and criteria for determining the identity and purity of crude drugs, particularly in powdered form. Additionally, the total ash content of a crude drug indicates the level of care in its preservation, as well as the purity of both the raw and prepared drug. Acid insoluble ash, which is a component of total ash, measures the amount of silica, primarily in the form of sand. Water and Alcohol soluble extractive values indicates the compounds which are soluble in specific medium. Here the results of raw material comply the standards of Ayurvedic pharmacopeia of India. By the Physicochemical tests, the raw material possesses premium quality for the preparation of Kokilakshakam kashayam.

Organoleptic and Physicochemical Assessment

Organoleptic and physicochemical assessments are fundamental for the identification and quality evaluation of a product, based on sensory perception and basic laboratory instruments. The organoleptic parameters of the freshly prepared *Kokilakshakam Kashayam* were analyzed, and the details are provided in Table no: 4.

Table 4 Organoleptic and physicochemical parameters of *Kokilakshakam kashayam*.

No	Parameters	Results
1	Colour	Dark brown
2	Odour	Characteristic
3	Taste	Bitter
4	pH	5.68
5	Specific gravity	1.03
6	Total soluble solids	9

3.2. Preliminary Phytochemical Analysis

Phytoconstituents present in *Kokilaksha* and *Guduchi* are responsible for the therapeutic profile of *Kokilakshakam kashayam*. As a result, it is essential to develop a standardization method based on the presence of Phytochemicals. Therefore, primary phytochemical analysis is crucial to determining the effectiveness of a particular drug. The phytochemical constituents found in *Kokilakshakam Kashayam* are listed in Table-5.

Table 5 Phytochemical analysis of *Kokilakshakam kashayam*

Sl No:	Organic Phytochemical constituents	Name of the test conducted	Present/Absent
1	Carbohydrate	Molisch's test	-
2	Sugar	Benedict's test	-
3	Ketose	Seliwanoff's test	-
4	Protein	Biuret test	-
5	Starch	K I test	+
6	Glycoside	Keller killiani test	-
7	Steroid	Salkowski test	-
8	Terpenoid	Salkowski test	+
9	Flavonoid	Alkaline reagent	+
10	Phenol	Phenol reagent test	+
11	Saponin	Foam test	+
12	Alkaloid	Wagner reagent	+
13	Tannin	Ferric chloride test	-
14	Coumarin	NaOH test	+

'+': Presence, ' –' : Absence

2.4. Thin Layer Chromatography (TLC) Fingerprint Analysis

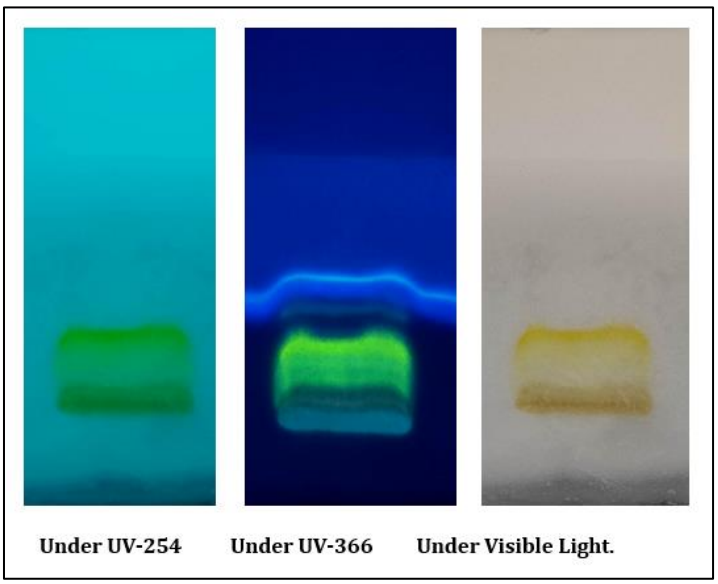

Figure 2 TLC profile of *Kokilakshakm kashayam*

Thin Layer Chromatography (TLC) is a straight forward and valuable tool for standardizing Raw drugs and formulations. Chromatographic fingerprinting, which helps in analyzing the chemical composition of herbal drug products, is

particularly useful for ensuring batch-to-batch consistency. The TLC profile of *Kokilakshakam Kashayam* shows Rf values of 0.08, 0.15, 0.21, and 0.31, and under UV light at 254 nm and 366 nm. The pharmacognostical and phytochemical evaluation of *Kokilakshakam Kashayam* revealed that the formulation contains several bioactive compounds that justify its traditional use. The presence of alkaloids, flavonoids, and tannins suggests its potential for anti-inflammatory, antioxidant, antimicrobial, and immune-modulating properties .[7,8] These properties align with its traditional indications for Arthritis. The observed presence of phenolics and flavonoids suggests antioxidant potential, which may contribute to its protective effects on cells and tissues.[12,13]

The findings also support the hypothesis that *Kokilakshakam Kashayam*, through its synergistic ingredients, may provide multifaceted therapeutic benefits, including antimicrobial, anti-inflammatory, and antioxidant activities.

4. Conclusion

The goal of this study is to contribute to the standardization of traditional medicines to facilitate their scientific validation and acceptance. *Kokilakshakam Kashayam* is a promising Ayurvedic formulation that combines the therapeutic benefits of *Kokilaksha* and *Guduchi* for managing gout and other inflammatory conditions. Its rich phytochemical profile, including terpenoids, flavonoids, alkaloids, and saponins, contributes to its efficacy in reducing inflammation, improving metabolic functions, and promoting overall health. Further clinical studies are recommended to validate its long-term therapeutic benefits and establish its role in modern integrative medicine. Furthermore, this scientific validation aids in the development of new treatment protocols and can serve as a reference standard for *Kokilakshakam Kashayam.*

Compliance with ethical standards

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Disclosure of conflict of interest

The authors have no conflicts of interest to declare

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