

"Illuminating Nature: Fluorescence Profiling and Phytochemical Analysis of *Cissampelos pareira*."

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Abstract

Background: Plant-based medicine is becoming more and more well-liked as a natural and sustainable substitute for traditional medical care. Many contemporary medications are made from plant chemicals, and medicinal plants have been used for generations to treat illnesses and enhance health. Linn. *Cissampelos Pareira*. The Charaka Samhita and Sushruta Samhita both mention the perennial climber (*Patha* or *Laghupatha*), a significant Ayurvedic herb in the family Menispermaceae. It has historically been used to treat wounds, metabolic issues, urinary tract problems, fever, inflammation, and gastrointestinal issues.

Material: A recognized Ayurvedic raw medicine supplier provided *Patha* (*Cissampelos pareira*), a perennial herb belonging to the Menispermaceae family. In accordance with conventional Ayurvedic Pharmacopoeia requirements, the plant sample was validated using both macroscopic and microscopic properties.

Method: Here, prepare the Fluorescence profiling and phytochemical analysis of *Cissampelos pareira*.

Observation and result: Phytochemical and Fluorescence profiling of *Patha* were observed significantly and mentioned in Tables 3 and 4.

Discussion: - *Patha* showed high storage stability with a low moisture content (LOD 5.40%). The levels of water-soluble ash (2.046%), acid-insoluble ash (0.847%), and total ash (3.142%) indicated the existence of water-soluble minerals and little inorganic contaminants. Polar and somewhat polar phytoconstituents were found in aqueous (15.08%) and alcohol (13.73%) extractive levels. Fluorescence investigation revealed distinctive color shifts under longwave UV (365 nm), shortwave UV (254 nm), and visible (550 nm), offering a helpful parameter for *Patha* identification and authentication.

Conclusion: The physicochemical and fluorescence characteristics established reliable quality control parameters for the identification and standardization of *Patha*.

Keywords: *Cissampelos Pareira*, *patha*, Fluorescence, phytochemical analysis.

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1. Introduction

Plant-based medicine has gained popularity in recent years as a more natural and environmentally friendly alternative to conventional healthcare. For millennia, humans have relied on medicinal plants to treat illness, maintain well, and improve overall well-being. Many modern medicines are still derived from herbs and plant compounds, indicating nature's long-standing role in medical science.

Concerns about the side effects of chemical-based drugs are one of the primary reasons plant-based therapy is gaining popularity. Although synthetic drugs are useful in treating a variety of illnesses, excessive use can result in unwanted side effects such as allergic reactions, digestive difficulties, dependence, reduced immunity, and organ damage.

Long-term use of chemical drugs can potentially lead to additional health problems rather than a complete recovery from the sickness. As a result, many people turn to natural and herbal remedies for a safer option.

Cissampelos pareira Linn., belonging to the family *Menispermaceae*¹, is a significant perennial climbing herb in the traditional Indian medical system of Ayurveda. Commonly known as *Patha* or *Laghupatha*, it has been used therapeutically for millennia to address a wide array of conditions, including inflammatory, infectious, metabolic, and gynaecological disorders.

The therapeutic importance of *Patha* is well documented in classical Ayurvedic texts, such as the *Charaka Samhita* and the *Sushruta Samhita*. These foundational sources classify the plant under

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several important therapeutic groups, reflecting its broad pharmacological potential. *Patha* is described as *Jvarahara/Jvaraghna*², indicating antipyretic activity; *Sandhaniya*³, denoting its role in promoting tissue repair and healing; and *Stanyashodhana*⁴, signifying its use in the purification and regulation of lactation in nursing mothers. It is also categorized as *Mutrala*⁵, functioning as a diuretic, and as *Deepana*⁶–*Pachana*⁷, supporting appetite stimulation and digestive function. Additionally, its designation as *Vranaropana*⁸ highlights its utility in wound healing. Traditionally, *Patha* has been employed in the management of urinary disorders, fever, inflammation, wounds, and metabolic disturbances, in addition to its primary application in gastrointestinal ailments.

Distribution and Habitat

This valuable medicinal plant is naturally distributed across the tropical and subtropical regions of India. It is particularly prevalent in states such as Assam, Bihar, Himachal Pradesh, Rajasthan, and the Konkan region⁹. The plant is frequently harvested from the wild due to its extensive use.

The plant is a perennial climbing shrub with branches that are either pubescent or glabrous. The leaves are peltate, reniform to orbicular in shape, measuring 3.8–10 cm in diameter. The flowers are small, greenish-yellow, and unisexual. The fruit is a red, hairy drupe. Root microscopy reveals the presence of cork consisting of 6–10 layers, stone cells, radiating xylem strands numbering 8–12, and medullary rays loaded with starch¹⁰.

Its extensive medicinal value has led to numerous phytochemical and pharmacological investigations that have revealed the presence of isoquinoline alkaloids, flavonoids, terpenoids, sterols, and essential oils¹¹, which contribute to a wide spectrum of biological activities, including anti-inflammatory, antidiarrheal, hepatoprotective, and antimalarial effects¹².

Here, prepare the Fluorescence profiling and phytochemical analysis of *Cissampelos pareira* (*Patha*) for further use as an anti-inflammatory, anti-infectious, metabolic-balance, and other useful applications.

2. Aim and Objectives

Aim

To characterize the fluorescence profile and phytochemical composition of *Cissampelos pareira* for pharmacognostic identification and standardization.

Objectives

1. To evaluate the fluorescence behaviour of *Cissampelos pareira* under visible and UV light using chemical reagents.
2. To perform qualitative phytochemical screening of solvent extracts.

3. To establish reference fluorescence and phytochemical parameters for authentication and quality control.

3. Materials and Methods

3.1 Material

Patha is a perennial herb; its botanical name is *Cissampelos pareira*, and it belongs to the *Menispermaceae* family.

This review employed a structured qualitative research approach. The methodology included:

3.1.1 Literature Sources

- **Ayurvedic classics:** *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, and various *Nighantu* (*Bhavaprakasha*, *Dhanvantari*, *Kaiyadeva*, *Raja Nighantu*).
- **Ethnobotanical records:** Traditional use reports from northeastern and central Indian communities.
- **Botanical and pharmacognostic references** describing macroscopic and microscopic features.
- **Phytochemical studies:** peer-reviewed publications analysing alkaloids, flavonoids, and secondary metabolites.
- **Pharmacological studies:** in vitro, in vivo, and preliminary clinical studies relevant to the plant's therapeutic activities.

3.2. Collection and Authentication

Raw drug material of *Cissampelos pareira* (*Patha Pachang*) was procured from a certified Ayurveda raw drug supplier. Authentication was performed using macroscopic and microscopic characteristics based on standard Ayurvedic pharmacopoeial guidelines.

Table 1. Properties of material (*Patha*) as per ancient text¹³

Sl. no.	Properties of <i>Patha</i> as per the text	
1.	<i>Rasa</i>	<i>Tikta</i>
2.	<i>Guna</i>	<i>Laghu, Tikshna</i>
3.	<i>Virya</i>	<i>Ushna</i>
4.	<i>Vipaka</i>	-
5.	<i>Prabhava</i>	<i>Vatkaphara</i>
6.	<i>Karma</i>	<i>Grahi, Vishghna, Balya</i>
7.	<i>Rogaghnata</i>	<i>Atisaar, Chhardi, Krumi, Shoola, Jwara</i>

3.3 Methods

3.3.1 Physicochemical Analysis¹⁴

Preliminary quality-control parameters were evaluated, including:

- Loss on drying (LOD)
- Total ash
- Acid-insoluble ash
- Water-soluble ash
- Aqueous extractive value

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• Alcohol extractive value
Methods followed the API (Ayurvedic Pharmacopoeia of India) protocols.

3.4. Fluorescence Analysis¹⁵

Powdered drug material was observed under visible light (550 nm), short-UV (254 nm), and long-UV (365 nm) after treatment with standard reagents. Fluorescence characteristics were recorded as per standard pharmacogenetic procedures.

3.5. Preliminary Phytochemical Screening¹⁶

Aqueous and alcoholic extracts were subjected to qualitative phytochemical tests to detect the presence of:

- Carbohydrates
- Reducing sugars
- Monosaccharides
- Proteins & amino acids
- Flavonoids
- Alkaloids
- Tannins
- Glycoside classes (cardiac, anthraquinone, saponin)

Tests were conducted according to standard protocols.

3. Observation and Results

Result and Observation Recorded Based on Selective Methods and Protocol

Table No. 2:Physico-chemical analysis of raw drugs

Drug	L O D (%)	To tal as h (%)	Acid Insol uble Ash (%)	Wa ter- sol ubl e ash (%)	(Aq. extra ctive (%)	(Alco hol extra ctive (%)
<i>Patha</i> (Whole part)	5.40	3.142	0.847	2.046	15.08	13.73

Table No. 3Fluorescence analysis of *Patha*

Reagent	<i>Patha</i>		
	550 nm	365nm	254nm
Powder	Light brown	White	Green
1 N HCL	Light brown	Light greenish	Green
1 N NaOH	Brown	Dark green	Dark green
50% KOH	Brown	Brown	Green
50% H₂SO₄	Green	Brown	Black-green
Con c. H₂SO₄	Black	Black	Black
50% HNO₃	Brown	Brown	Green

Con c.	Black	Orange brown	Green
Iodine water	Black	Brown	Green
Acetic acid	White	Light brown	Green



(a)



(b)

Fig. 1 Phytochemical Analysis of *Patha* (a) Water soluble extractive, (b)Alcohol soluble extractive

Table No. 4 Preliminary Organic Phytochemical Analysis of Raw Drug *Patha*:

Test	<i>Patha</i>	
	Aq. Extract	Alcohol extract
Carbohydrate	P	P
Reducing sugar	P	P
Monosaccharides	P	P
Hexose sugar	A	A
Proteins	A	P
Amino acid	A	P
Steroids	A	A
Flavanoids	P	P
Alkaloids	A	P

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Tannins	P	P
Glycosides-Cardiac G.	A	A
Anthraquinone G.	A	A
Saponin G.	A	A

*P= Present, A= Absent

4. Discussion.

3.2 Ayurvedic Properties

The drug possesses *Tikta* (bitter) rasa, with *Laghu* and *Tikshna* gunas. It exhibits *Ushnavirya* and *Katu*vipaka. In terms of doshic action, it is *Tridoshaghna*, effectively alleviating *Vata*, *Pitta*, and *Kapha*. The therapeutic actions attributed to the drug include *Mutrala* (diuretic), *Jvarahara* (antipyretic), *Shoolahara* (analgesic), *Pachana* (digestive), *Deepana* (appetizer), *Kusthaghna* (useful in skin disorders), *Vishaghna* (antitoxic), and *Vranaropana* (wound healing).

Physico-chemical analysis

Patha's physico-chemical examination revealed a Loss on Drying (LOD) value of 5.40%, indicating a low moisture content that may improve stability and lower the likelihood of microbial development during storage. The overall amount of inorganic materials in the medication was determined to be 3.142% of the total ash value. Low levels of siliceous materials and other contaminants were indicated by the acid-insoluble ash value (0.847%). Water-soluble inorganic components may be present, as shown by the water-soluble ash value of 2.046%. *Patha* was found to have a variety of polar and somewhat polar phytoconstituents, as evidenced by its extractive values of 15.08% in aqueous extract and 13.73% in alcohol extract.

Fluorescence analysis is an essential method for identifying and assessing crude medicines is fluorescence analysis. Under visible light (550 nm), Longwave (365 nm), and shortwave (254 nm), the powdered medication and its interactions with several chemical reagents displayed distinctive color changes. These fluorescent features could be useful for *Patha* adulteration detection and



identification.

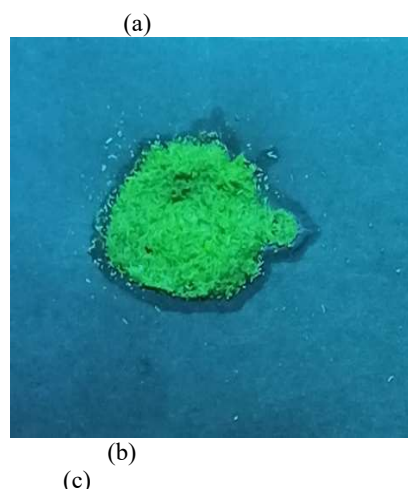


Fig 2 Fluorescence of *Patha* Under Different UV Lightwave, (a). Under visible light (550 nm), (b) Under shortwave (254 nm), (c) Longwave (365 nm)

Preliminary phytochemical

Important bioactive components were found in aqueous and alcohol extracts after preliminary phytochemical screening. Both aqueous and alcoholic extracts contained carbohydrates, reducing sugars, monosaccharides, flavonoids, and tannins. Alkaloids, proteins, and amino acids were found in the alcohol extract but not in the aqueous extract, suggesting that these components are more soluble in alcohol. Neither extract contained hexose sugars, steroids, cardiac glycosides, anthraquinone glycosides, or saponin glycosides.

Given that flavonoids and tannins are frequently linked to biological activities like antibacterial, anti-inflammatory, and free radical scavenging effects, their presence suggests that *Patha* may have antioxidant and medicinal qualities. The existence of pharmacologically active secondary metabolites is further shown by the identification of alkaloids in the alcohol extract. The observed results provide preliminary evidence for the phytochemical potential of *Patha* and validate its traditional therapeutic significance.

3.4 Phytochemical Analysis

Table No. 5 Chemical constituents of *Patha* according to the part used¹⁷

S. no.	Part Used	Chemical Constituents
	Root	- Cissamine, Hayatine, Pareirine - Berberine, Tetrandrine, and Cycleanine - Essential oils, sterols, fixed oils
	Rhizome	- Hayatine, Hayatidine - Methylberberine

		Dicentrine and Insularine
	Leaf	- Kaempferol glycosides - Quercetin mono-/di-glycosides - Cycloanin
	Whole Plant	Pareirubrine A & B, Pelosine, and Cissampareine



Ethnomedicinal reports, particularly their use in reproductive health and family planning, suggest bioactive compounds that may influence hormonal and uterine physiology, warranting further pharmacological investigation. The plant's broad

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