WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 6, 1160-1171. Research Article ISSN 2277–7105

PHYSICOCHEMICAL ANALYSIS AND HPTLC EVALUATION OF KARPASASTHYADI CHURNA

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Article Received on 17 Feb. 2026,
Article Revised on 06 March 2026,
Article Published on 16 March 2026

https://doi.org/10.5281/zenodo.19046726

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How to cite this Article: Dr. Sanila V.K (MD) Ayu[1]*, Dr. Aswathy K.[2], Dr. Anjitha K. R.[3], Dr. Saravan K. V.[4], Dr. Ramesh Kumar[5], Dr. Jyothis Rajan[6] (2026). Physicochemical Analysis and Hptlc Evaluation of Karpasasthyadi Churna. World Journal of Pharmaceutical Research, 15(6), 1160–1171.

ABSTRACT

Background: *Karpasasthyadi Churna* is a compound Ayurvedic formulation mentioned in *Sahasrayogam* (*Churna Prakarana*), traditionally indicated for its anti-emetic (*Chardi-nigrahana*) properties. Despite its classical mention and therapeutic potential, the formulation lacks systematic pharmaceutical and analytical standardization. **Aim:** The present study aims to authenticate the raw materials, prepare *Karpasasthyadi Churna* in accordance with classical Ayurvedic guidelines and establish a comprehensive analytical profile through pharmaceutical, physicochemical, phytochemical, microbiological, heavy metal and High-Performance Thin Layer Chromatography (HPTLC) evaluations, thereby ensuring its quality, safety and standardization. **Materials and Methods:** Raw drugs were procured, authenticated and processed following classical methods described in *Sharangadhara Samhita*. Each ingredient was separately powdered, sieved through mesh No. 85 and mixed in equal proportions. The final formulation was subjected to organoleptic evaluation, physicochemical analysis (pH, loss on drying, total ash, acid-insoluble ash, water and alcohol-soluble extractives), microbiological screening, heavy metal analysis by ICP-OES and HPTLC fingerprinting. **Results:** The formulation yielded a fine, pale brown powder with a characteristic cardamom odour and astringent-to-

sweet taste. Physicochemical analysis revealed: pH 6.20, loss on drying 7.18% w/w, total ash 3.08% w/w, acid-insoluble ash 1.00% w/w, water-soluble extractives 45.85% w/w, and alcohol-soluble extractives 32.33% w/w. Microbial counts were within permissible limits (bacterial count: 30 cfu/g; yeast and mould: 20 cfu/g), with absence of specific pathogens. Heavy metals (arsenic, cadmium, lead, mercury) were not detected. HPTLC fingerprinting at 254 nm revealed 7 peaks and at 366 nm revealed 8 peaks, indicating diverse phytoconstituents. **Conclusion:** The study successfully established pharmaceutical and analytical standards for *Karpasasthyadi Churna*, confirming its authenticity, purity, safety and the presence of therapeutically significant phytoconstituents. The generated data can serve as reference standards for quality control and batch-to-batch consistency.

KEYWORDS: *Karpasasthyadi Churna*, Standardization, HPTLC, *Chardi*, Antiemetic, *Sahasrayogam.*

INTRODUCTION

Ayurveda, one of the most ancient and comprehensive healthcare systems globally, describes various dosage forms under the concept of *Panchavidha Kashaya Kalpana* (5 primary dosage forms) which include *Swarasa* (fresh juice), *Kalka* (paste), *Kwatha* (decoction), *Hima* (cold infusion), and *Phanta* (hot infusion). Among these, *Kalka* represents one of the fundamental preparations, and *Churna* (powder) is considered an *Upakalpana* (sub-category) of *Kalka Kalpana.*[1]

Churna, defined as a fine powder of dried drugs, is one of the simplest and most convenient dosage forms in *Ayurveda* due to its ease of preparation, extended shelf life and general acceptability across different age groups.[2] In Ayurvedic pharmaceutics, *Churna* occupies a well-established position owing to its wide therapeutic applicability and ease of administration.

Among the various compound formulations described in classical literature, ***Karpasasthyadi Churna***[3] is categorized under *Misra Churna*[1] (compound powder formulations) and is documented in the classical compendium *Sahasrayoga* (*Churna Prakarana*), an authoritative and widely followed Ayurvedic text in the Kerala tradition.[4]

This formulation comprises five ingredients in equal proportions: *Pippali* (*Piper longum*), Ela (*Elettaria cardamomum*), Karpasa Beeja (*Gossypium herbaceum* seeds), *Laja* (puffed rice) and *Sita* (sugar). Most of these ingredients have been traditionally described as

possessing *Chardi-nigrahana* (anti-emetic) properties. Notably, *Laja* is specifically included in the *Charaka Samhita* under the *Chardi Nigrahana Mahakashaya*,[5] a group of drugs indicated for the management of vomiting. Furthermore, in the *Sushruta Samhita* (*Uttara Sthana*), *Pippali*[6] is advised to be consumed along with ghee, honey and sugar-of which sugar itself is one among the five ingredients of this formulation. These classical references strongly indicate the anti-emetic action of *Karpasasthyadi Churna* and provide a sound textual basis for its therapeutic application in the management of *Chardi* (vomiting).

Despite its classical mention and therapeutic potential, systematic pharmaceutical and analytical standardization of *Karpasasthyadi Churna* remains undocumented. The present study addresses this gap by establishing comprehensive quality control parameters for this formulation.

AIM

To prepare and evaluate *Karpasasthyadi Churna* in accordance with the classical reference of *Sharangadhara Samhita* (*Madhyama Khanda*) and the guidelines of the Ayurvedic Pharmacopoeia of India.

MATERIALS AND METHODS

The present study was carried out to prepare and evaluate *Karpasasthyadi Churna* following classical references and standard analytical guidelines. The work was systematically divided into two phases: pharmaceutical study and analytical study. The pharmaceutical study involved procurement, authentication, and preparation of the formulation as per the classical method, while the analytical study included organoleptic, physicochemical, microbiological, heavy metal and chromatographic evaluations to assess the quality, purity and safety of the formulation.

Settings and Source of Data

The pharmaceutical preparation was carried out in the Department of *Rasashastra* and *Bhaishajya Kalpana*, Government Ayurveda College, Kannur. Analytical studies were conducted at the Quality Assurance Department and Quality Control Laboratory of Arya Vaidya Sala, Kottakkal.

1. Pharmaceutical Study

The pharmaceutical study of *Karpasasthyadi Churna* was carried out strictly in accordance with the principles of *Churna Kalpana* described in *Sharangadhara Samhita*, *Madhyama Khanda*.[7]

Procurement and Authentication: All raw drugs were procured from authenticated vendors and were examined for quality and purity as per the standards of the Ayurvedic Pharmacopoeia of India.[8] The materials were thoroughly cleaned to remove dust and foreign matter.

Processing: All drugs except *Sita* (sugar) were shade-dried to preserve their potency and stored separately in airtight, properly labelled containers to prevent moisture exposure and cross-contamination.

Powdering and Sieving: Fifty grams of each ingredient were taken and powdered separately using a mechanical grinder. The rationale for separate powdering lies in the classical pharmaceutico-technical consideration that different drugs possess varying consistencies-soft, medium, and hard. If mixed and pounded together initially, the softer drugs become powdered quickly while harder drugs remain coarse, leading to non-uniform particle size. During sieving, this may result in variation in the ratio of ingredients as prescribed in the formulation. Moreover, drugs containing volatile oils (*Ela*) are susceptible to evaporation or degradation due to prolonged grinding, especially if processed along with harder substances requiring extended pulverization.[2]

Each powdered drug was passed through sieve No. 85 (mesh size 180 µm). When a powder passes through sieve number 85, it indicates a fine particle size. As the particle size decreases, the surface area increases, which promotes faster dissolution and enhances absorption, thereby improving bioavailability.[2]

Mixing: Thereafter, 10 g of each sieved powder was accurately weighed and mixed uniformly by geometric dilution to obtain a homogeneous blend. Thus, 50 g of *Karpasasthyadi Churna* was prepared and stored in an airtight container for analysis. All procedures were carried out under hygienic conditions using standard laboratory equipment to ensure accuracy, reproducibility and adherence to classical Ayurvedic pharmaceutical standards.

Table 1: Ingredients of Karpasasthyadi Churna.

S. No.	Drug	Part Used	Botanical Name	Proportion
1	*Pippali*	Fruit	*Piper longum* Linn.	1 part
2	*Ela*	Fruit	*Elettaria cardamomum* Maton	1 part
3	*Karpasa Beeja*	Seed	*Gossypium herbaceum* Linn.	1 part
4	*Laja*	Puffed Rice	*Oryza sativa* Linn.	1 part
5	*Sita*	Crystalline Sugar	*Saccharum officinarum* Linn.	1 part

Figure 1: Raw ingredients of *Karpasasthyadi Churna.*

(*Laja, Ela, Karpasa Beeja, Pippali, Sita*)

Figure 2: Final formulation of *Karpasasthyadi Churna.*

1. Analytical Study

A) Organoleptic Evaluation

The formulated *Churna* was evaluated for the following organoleptic characteristics:

- Colour
- Odour

- Taste
- Consistency.

B) Physicochemical Parameters

The following physicochemical parameters were analysed as per standard procedures

1. pH (10% aqueous solution)
2. Loss on drying (% w/w)
3. Total ash (% w/w)
4. Acid-insoluble ash (% w/w)
5. Water-soluble extractive (% w/w)
6. Alcohol-soluble extractive (% w/w)

C) Microbial Analysis

- Total bacterial count (cfu/g)
- Total yeast and mould count (cfu/g)
- Test for specific pathogens: *Escherichia coli, Salmonella typhi, Pseudomonas aeruginosa, Staphylococcus aureus.*

D) Heavy Metal Analysis by ICP-OES

Analysis for heavy metals including arsenic (As), cadmium (Cd), lead (Pb), and mercury (Hg) was performed using Inductively Coupled Plasma-Optical Emission Spectrometry.

E) HPTLC Fingerprinting

High-Performance Thin Layer Chromatography was performed using

- **Sample preparation:** Methanolic extract of *Karpasasthyadi Churna*
- **Stationary phase:** Silica gel 60 F_{254} TLC plates
- **Mobile phase:** Toluene: Ethyl acetate: Formic acid: Methanol (7:5:1:0.5 v/v)
- **Detection:** At 254 nm (short UV), 366 nm (long UV), and under white light.

RESULTS

1. Pharmaceutical Study

The pharmaceutical preparation was carried out under standard conditions, and the final yield of the *Churna* was 50 g. The formulation was obtained as a fine, homogeneous powder with characteristic aroma.

2. Analytical Study

A) Organoleptic Characters

Table 2: Organoleptic features of *Karpasasthyadi Churna.*

S. No.	Parameter	Observation
1	Colour	Pale brown
2	Taste	Astringent to sweet
3	Odour	Characteristic smell of cardamom
4	Consistency	Fine powder

B) Physicochemical Parameters

Table 3: Physicochemical analysis of *Karpasasthyadi Churna.*

Parameter	Value (% w/w)
pH (10% solution)	6.20
Loss on drying	7.18
Total ash	3.08
Acid-insoluble ash	1.00
Water-soluble extractive	45.85
Alcohol-soluble extractive	32.33

C) Microbial Analysis

- **Total bacterial count:** 30 cfu/g
- **Total yeast and mould count:** 20 cfu/g.

Table 4: Test for specific pathogens.

S. No.	Pathogen	Result	Permissible Limit
1	*Escherichia coli*	Absent	Absent
2	*Salmonella typhi*	Absent	Absent
3	*Pseudomonas aeruginosa*	Absent	Absent
4	*Staphylococcus aureus*	Absent	Absent

D) Heavy Metal Analysis by ICP-OES

Table 5: Heavy metal content in *Karpasasthyadi Churna.*

S. No.	Heavy Metal	Result	Permissible Limit (API)
1	Arsenic (As)	Not detected	3.0 ppm
2	Cadmium (Cd)	Not detected	0.3 ppm
3	Lead (Pb)	Not detected	10.0 ppm
4	Mercury (Hg)	Not detected	1.0 ppm

E) HPTLC Fingerprinting

Table 6: Chromatographic results of *Karpasasthyadi Churna.*

Detection Wavelength	Number of Peaks	Rf Values
Short UV (254 nm)	07	0.10, 0.23, 0.36, 0.43, 0.56, 0.69, 0.76
Long UV (366 nm)	08	0.03, 0.10, 0.36, 0.41, 0.54, 0.62, 0.69, 0.81

Total peak area at 254 nm: 118844.7 AU

Total peak area at 366 nm: 39632.4 AU

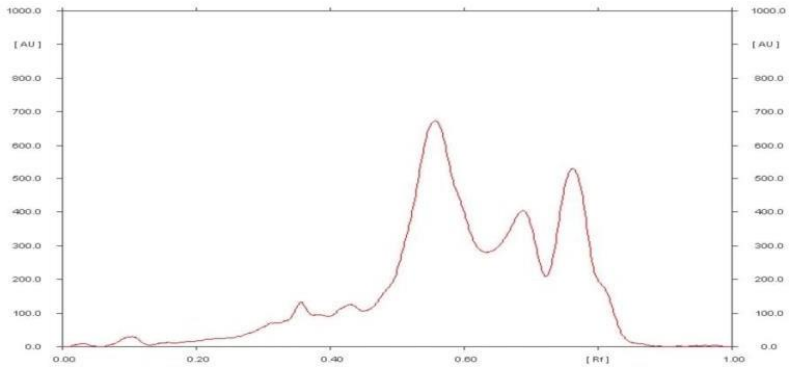

Figure 3 (A): Chromatographic peak display of *Karpasasthyadi Churna* at 254 nm.

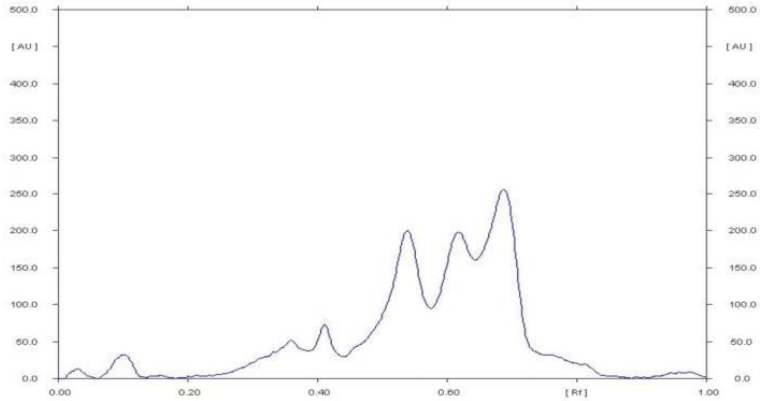

Figure 3 (B): Chromatographic peak display of *Karpasasthyadi Churna* at 366 nm.

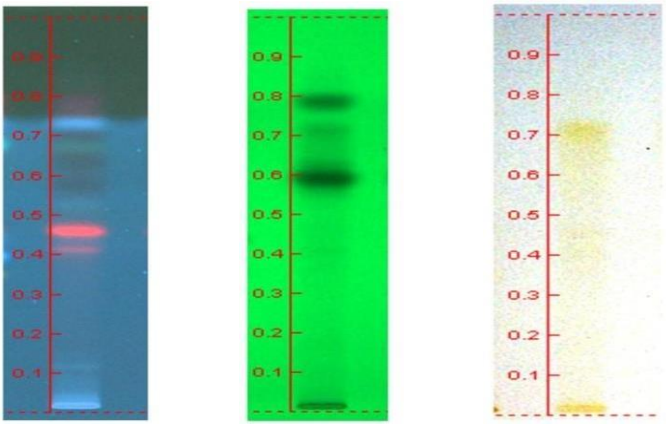

Figure 4: HPTLC chromatograms of *Karpasasthyadi Churna* visualized at 254 nm, 366 nm, and white light.

DISCUSSION

The preparation and evaluation of *Karpasasthyadi Churna* were undertaken in accordance with classical Ayurvedic guidelines and validated through modern analytical parameters to ensure quality and safety. All raw drugs were procured from reliable suppliers and authenticated as per the standards of the Ayurvedic Pharmacopoeia of India[8] to confirm their identity, purity,

and suitability for formulation.

Pharmaceutical Considerations

Fifty grams of each ingredient were taken and powdered separately. This methodological approach aligns with classical pharmaceutical principles, recognizing that different drugs possess varying physical characteristics-soft (*Ela*, *Laja*), medium (*Pippali*, *Sita*), and hard (*Karpasa Beeja*). Separate powdering ensures uniform particle size distribution and maintains the prescribed ratio of ingredients in the final formulation. Additionally, drugs containing volatile oils (*Ela*) are susceptible to evaporation or degradation during prolonged grinding; separate processing minimizes such losses.[2]

The use of sieve No. 85 (180 µm) ensures fine particle size, which increases surface area and subsequently enhances dissolution rate and bioavailability of active constituents.[2] Geometric mixing ensures homogeneous distribution of all ingredients throughout the formulation.

Physicochemical Parameters

The pH of the formulation was found to be 6.20, indicating a slightly acidic to near-neutral nature. This pH range is generally suitable for oral administration and helps maintain the stability of active constituents. The slightly acidic pH may also contribute to the formulation's digestive and anti-emetic properties.

The loss on drying (LOD) value of 7.18% w/w indicates controlled moisture content within acceptable limits (typically <10% for powdered formulations). Appropriate moisture content is crucial for maintaining stability and preventing microbial proliferation during storage.

Total ash (3.08% w/w) represents the inorganic residue remaining after complete incineration and serves as a marker of quality and purity. This relatively low value indicates minimal inorganic content. The acid-insoluble ash value (1.00% w/w) reflects the siliceous impurities (such as sand and soil) present in the formulation. The low value confirms minimal contamination and good manufacturing practices during processing.

The water-soluble extractive value (45.85% w/w) was notably higher than the alcohol-soluble extractive value (32.33% w/w), suggesting that a significant proportion of active constituents are polar in nature and readily extractable in aqueous media. This is particularly relevant as traditional administration of *Churna* often involves mixing with water or honey. The high extractive values indicate good therapeutic potential and bioavailability of the formulation.

Microbial and Heavy Metal Safety

The total viable count provides a quantitative estimate of microorganisms present in the sample. The bacterial count (30cfu/g) and yeast/mould count (20 cfu/g) were well within the permissible limits specified in the Ayurvedic Pharmacopoeia of India (10^5 cfu/g for bacteria; 10^3 cfu/g for fungi). The absence of specific pathogens (*E. coli*, *S. typhi*, *P. aeruginosa*, *S. aureus*) confirms the microbiological safety and hygienic quality of the formulation, indicating adherence to Good Manufacturing Practices during preparation.

Heavy metal analysis by ICP-OES confirmed that arsenic, cadmium, lead, and mercury were not detected in the formulation. This is a critical safety parameter, as chronic exposure to heavy metals can lead to serious health consequences including neurotoxicity, nephrotoxicity and carcinogenicity. The absence of detectable heavy metals ensures the formulation's safety for long-term therapeutic use.

HPTLC Fingerprinting

HPTLC analysis provides a characteristic chemical fingerprint of the formulation, serving as a reliable tool for authentication and quality control. The chromatographic separation revealed 7 distinct peaks at 254 nm and 8 peaks at 366 nm, with well-resolved Rf values ranging from 0.10 to 0.76 (254 nm) and 0.03 to 0.81 (366 nm).

The detection at 254 nm primarily reveals UV-absorbing compounds such as alkaloids, flavonoids, and phenolic compounds, while visualization at 366 nm highlights fluorescent phytoconstituents including coumarins and certain essential oil components. The higher number of peaks at 366 nm (8 peaks) compared to 254 nm (7 peaks) suggests the presence of significant fluorescent compounds, possibly contributed by the volatile oil components of *Ela* (cardamom) and alkaloids from *Pippali*.

The distinct and well-resolved peaks reflect the complex phytochemical composition of the formulation and provide a characteristic fingerprint profile. Such chromatographic patterns can serve as reliable markers for standardization, authentication and ensuring batch-to-batch consistency of *Karpasasthyadi Churna*.

Therapeutic Correlation

The presence of piperine (from *Pippali*), volatile oils (from *Ela*), and flavonoids (from *Karpasa Beeja*) collectively supports the traditional claim of anti-emetic activity.

Piperine is known for its bioavailability-enhancing properties and digestive stimulant action. Cardamom oil possesses carminative and anti-spasmodic properties, while *Karpasa Beeja* (cotton seed) has been traditionally used in managing gastrointestinal disorders. *Laja* (puffed rice) provides a light, easily digestible base and *Sita* (sugar) offers quick energy and palatability.

The high water-soluble extractives (45.85%) suggest that the active principles are readily available when the *Churna* is administered with water or honey, as traditionally practiced. This pharmaceutical validation supports the classical method of administration.

CONCLUSION

The present study successfully established the pharmaceutical and analytical standards of *Karpasasthyadi Churna* through systematic physicochemical, microbiological, heavy metal, and HPTLC evaluations. The formulation was prepared following classical methods, yielding a fine, homogeneous powder with characteristic organoleptic properties.

Key findings include

- Optimal physicochemical parameters confirming quality and purity
- Microbial counts within permissible limits with absence of specific pathogens
- No detectable heavy metals, ensuring safety for therapeutic use
- Characteristic HPTLC fingerprint providing a reliable reference for standardization.

The generated data can serve as reference standards for quality control, batch-to-batch consistency, and future research on this classical Ayurvedic formulation. Further studies on specific anti-emetic activity through in-vivo models and clinical evaluation would provide additional validation of its therapeutic efficacy.

ACKNOWLEDGEMENT

The authors extend their heartfelt and profound gratitude to the Quality Assurance Department and Quality Control Laboratory of Arya Vaidya Sala, Kottakkal, for carrying out the analytical studies for this research work.

REFERENCES

1. Dr. Ravindra Angadi. A Text Book Of Bhaishajya Kalpana Vijnana [Pharmaceutical Science]. Chaukhambha Surbharati Prakashan; 2024; 85–100.
2. Dr. Yatish MR, Dr.Jagadeesh G Mitti D. SS. Review On Churna Kalpana. Int. J. Med.

Pharm. Sci., 2021; 2(2): 127–36.

3. K.V. Krishnan Vaidyan SGP, editor. Sahasrayogam. 24th ed. Vidhyarambham Publishers; 1946; 170.
4. K. P. Karthik, V. Rakesh Narayanan, Saketh Ram Thrigulla VKL. Sahasrayogam English Translation: A Timely Update to the Compendium. J Indian Med. Herit., 2024; 3(1).
5. Prof. K. R.Srikantha Murthy. Caraka Samhita Vol-1. 1st ed. Chaukhambha Orientalia; 2004; 82–83.
6. Prof.K.R.Srikantha Murthy. Susruta Samhita Vol-3. 1st ed. Chaukhambha Orientalia; 2017; 329–330.
7. Pandita Sarangadharacarya. Sharangadhara samhita. 2nd ed. Vidyasagar PPS, editor. Chowkhamba Krishnadas Academy; 2021; 178.
8. The Ayurvedic Pharmacopoeia Of India, Part-1, Vol-3. 1st ed. Ministry Of Health And Family Welfare, GOVT.