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Physicochemical And Phytochemical Profile Of Kampillakadichurna- A Classical Ayurvedic Formulation

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Abstract

Aim*: The present study was undertaken to evaluate the physicochemical and phytochemical and HPTLC of KampillakadiChurnain order to establish preliminary reference standards for its quality, purity, and therapeutic potential.*

Methods*: The formulation was prepared using standard Ayurvedic procedures. Physicochemical parameters, including ash values, loss on drying, moisture content, and HPTLC fingerprinting, were done following pharmacopoeial guidelines. Preliminary phytochemical screening was conducted using standard qualitative tests.*

Results*: The formulation showed a total ash value of 8.06%and anacid-insoluble ash value of 1.945%, confirming minimal contamination and acceptable purity. The moisture content (6.074%)andloss on drying (6.00%) were within permissible limits, indicating stability and low risk of microbial contamination. HPTLC analysis revealed eight distinct spots under short UV and eight spots under long UV, suggesting the presence of multiple phytoconstituents. Phytochemical screening confirmed the presence of alkaloids, flavonoids, glycosides, steroids, tannins, phenols, and terpenoids each associated with potential pharmacological activity.*

Conclusion:*The findings demonstrate that* KampillakadiChurna *meets the essential criteria of an ideal Churna formulation, with acceptable quality, purity, and stability. Since specific API standards for this formulation are not currently available, the present results may serve as baseline reference values for standardization. Furthermore, the study provides a foundation for pharmacological validation, safety profiling, and clinical research to establish its therapeutic efficacy and facilitate its integration into modern Ayurvedic pharmaceutics.*

INTRODUCTION

In Ayurvedic pharmaceutics, *Churna Kalpana* represents one of the oldest and most commonly prescribed solid dosage forms. Herbal powders can be prepared from a single plant material or from multiple ingredients blended in prescribed proportions. The effectiveness of these formulations depends not only on the inherent phytochemical constituents but also on processing parameters.

KampillakadiChurna[1]is described in Chakradutta in *Kapha-PittajaPramehachikitsa*, is a polyherbal powderwhich is prepared by mixing seven selected herbs in equal proportions.*Kampillaka* (*Mallotusphillipensis* Lam.)*phalraj*, *Saptparna* (*Alstoniascholaris* Linn.)*twak*, *Rohitaka* (*Tecomellaundulate* Sm.)*twak*, *Shaal* (*Shorearobusta*Gaertn.)*twak*, *Vibhitaka* (*Terminaliabelerica*Gaertn.)*phal*, *Kutaja* (*Holarrhenaantidysenterica* Linn.)*twak*, *Kapittha* (*Feronia*limonia Linn.)*phalmajja*. The constituent's herbs of *KampillakadiChurna*, sourced from the authentic herbal shop, underwent identification in Department of Botany, Faculty of Science, BHU, analytical study at the Dravyaguna department, Faculty of Ayurveda, IMS,BHU and Sri DharmasthalaManjunatheshwara Centre for Research in Ayurveda and Allied Sciences (Udupi, Karnataka).The present study focuses on Physio-Chemical Analysis, phytochemical characteristics and HPTLC of *KampillakadiChurna.*

Objectives

1. Analysis of the physio-chemical property of *KampillakadiChurna.*
2.Analysis of the phytochemical characteristics of *KampillakadiChurna.*
3. Evaluation of the HPTLC of *KampillakadiChurna*

Materials and Methods

Table 1: Ingredients of *KampillakadiChurna*(as per classical ratio)

S.N.	*Herb*	*Botanical name*	*Part Used*	*Proportion*
1	*Kampillaka*	*Mallotusphillipensis Lam.*	*Phalraj*	*1 Part*
2	*Saptparna*	*Alstoniascholaris Linn.*	*Twak*	*1 Part*
3	*Rohitaka*	*Tecomella undulate Sm.*	*Twak*	*1 Part*
4	*Shaal*	*ShorearobustaGaertn.*	*Twak*	*1 Part*
5	*Vibhitaka*	*Terminalia belericaGaertn.*	*Phal*	*1 Part*
6	*Kutaja*	*Holarrhenaantidysenterica Linn.*	*Twak*	*1 Part*
7	*Kapittha*	*Feronia limonia Linn.*	*Phalmajja*	*1 Part*

Physio-Chemical Analysis of *KampillakadiChurna*

Determination of Total Ash

About 2 g of the powdered drug was accurately weighed and placed in a pre-weighed silica crucible. It was incinerated gradually at a temperature not exceeding 450 °C until carbon-free ash was obtained. The final weight was recorded to calculate the total ash content.

Determination of Acid-Insoluble Ash

The total ash obtained was boiled with 25 ml of dilute hydrochloric acid for 5 minutes. The insoluble matter was collected on an ash less filter paper, washed with hot water, and ignited to constant weight. The residue obtained represented the acid-insoluble fraction of the total ash.

Determination of Water-Soluble Ash

The ash was boiled with 25 ml of distilled water for 5 minutes. The mixture was filtered through an ash less filter paper, and the residue was washed with hot water. This residue was ignited at a temperature not exceeding 450 °C for about 15 minutes. The weight of the insoluble residue was subtracted from the weight of the total ash, and the difference was taken as the water-soluble ash content.

Determination of pH

Dissolved 2 grams of the sample in 20 ml of distilled water (pH = 7) to prepare a stock solution. From this stock solution, prepared two different dilutions for *KampillakadiChurna* with a concentration of 1 mg/ml and another with 10 mg/ml. Measured the pH of these diluted solutions using a pH700-EUTECH meter (S/N 2882510).

Table 2: Physico-Chemical Analysis of *KampillakadiChurna*

S.No.	Test	Unit	Min.	Max	Test result
1.	Description		0.000	0.000	Fine greenish yellow powder with saline and slight bitter taste
2.	Moisture content[2]	%w/w	5.0000	10.000	6.074 %
3.	Loss on drying	% w/w	0.0000	10.000	6.00 %
4.	Ash[3]	% w/w	6.0000	16.000	8.06 %
5.	Acid insoluble ash	% w/w	0.0000	2.000	1.945 %
6.	Water soluble ash[4]	% w/w	2.0000	3.000	2.04 %
7.	Water insoluble ash	% w/w	0.89	13.70	2
8.	pH	1mg/ml 10mg/ml			5.1 4.4

Heavy Metal Analysis of *KampillakadiChurna*

Nitric-Hydrochloric Acid Digestion (1:3)

1. To the samples, 10 mL of freshly prepared acid mixture of 1:3 mixture of 65 % HNO_3 (SD Fine-Catno-39335L05) and 37 % HCl (SD Fine-Catno-20940L05) was added (2.5 ml nitric acid and 7.5 ml hydrochloric acid) respectively.

2. The mixture was boiled gently over a water bath (95 °C) for 4–5 h (or until the sample had completely dissolved.

Instrument: AAS (Atomic Absorption Spectrophotometer- Analyst 400 Perkin Elmer)

Table 3: Heavy Metal Analysis of *KampillakadiChurna*

Sr. No	Compound	Unit	Result	Reference Method
1	Arsenic	Ppm	BDL (DL- 0.05)	ARAS/CH/WI/55
2	Lead	Ppm	BDL (DL- 0.5)	ARAS/CH/WI/55
3	Mercury	Ppm	BDL (DL- 0.05)	ARAS/CH/WI/55
4	Cadmium	Ppm	BDL (DL- 0.1)	ARAS/CH/WI/55

DL- Detection Limit, BDL-Below Detection Limit

Phytochemical Analysis of *KampillakadiChurna*

*KampillakadiChurna*underwent phytochemical analysis to detect the presence of various compounds, including alkaloids, flavonoids, tannins, steroids, glycosides, terpenoids, phenols, saponins, and quinones.For phytochemical screening, 1ml of *KampillakadiChurna* extract (5mg/ml) was used to obtain a filtrate, which served as the test solution.

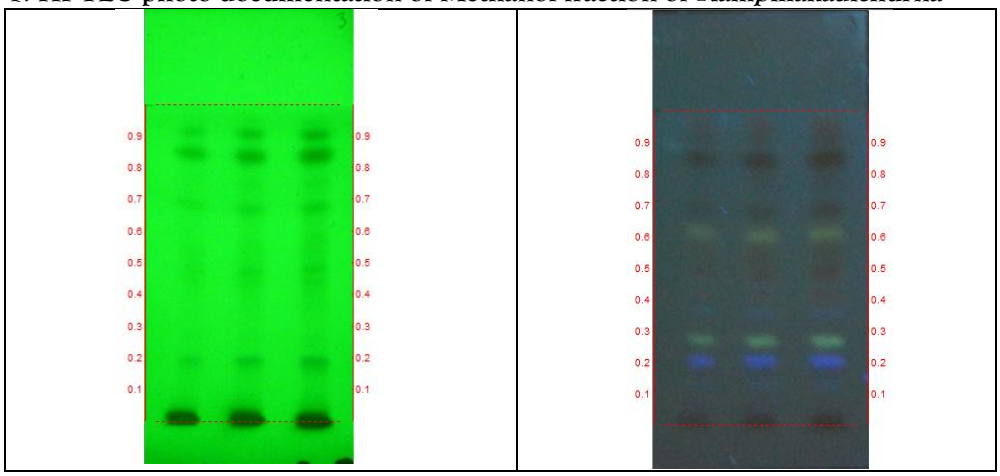
Table 4: Phytochemical Analysis of *KampillakadiChurna*

Phytochemical Group	Tests Applied	Observation	Result
Alkaloids	Dragendorff's, Wagner's, Mayer's	Coloured precipitates (orange-red, brown)	Positive
Flavonoids	Ferric chloride, Shinoda, H_2SO_4	Red/orange/blackish-red coloration	Positive
Glycosides	Keller–Killiani, Conc. H_2SO_4	Reddish-brown ring, reddish colour	Positive
Saponins	Foam test	Persistent 1 cm froth	Negative
Steroids	Salkowski, Liebermann–Burchard	Red ring + green upper layer	Positive
Terpenoids	Chloroform + H_2SO_4	Grey coloured solution	Positive
Tannins	Ferric chloride	Black precipitate	Positive
Phenols	$FeCl_3$	Intense coloration	Positive
Quinones	Alcoholic KOH / Conc. HCl	Red–blue colour / Yellow precipitate	Negative

HPTLC *Kampillakadichurna*

1 gram of *Kampillakadichurna* was weighed and dissolved in 10 ml of methanol. 3, 6 and 9µl of the above was applied on a pre-coated silica gel F_{254} on aluminium plates to a band width of 7 mm using Linomat 5 TLC applicator. The plate was developed Toluene: Ethyl Acetate: Formic acid (5.0: 4.0: 0.2).The developed plates were visualized in short UV, long UV and scanned under UV 254nm, 372nm. Rf, colour of the spots and densitometric scan were recorded.

Figure 1: HPTLC photo documentation of Methanol fraction of *Kampillakadichurna*



Short UV	Long UV

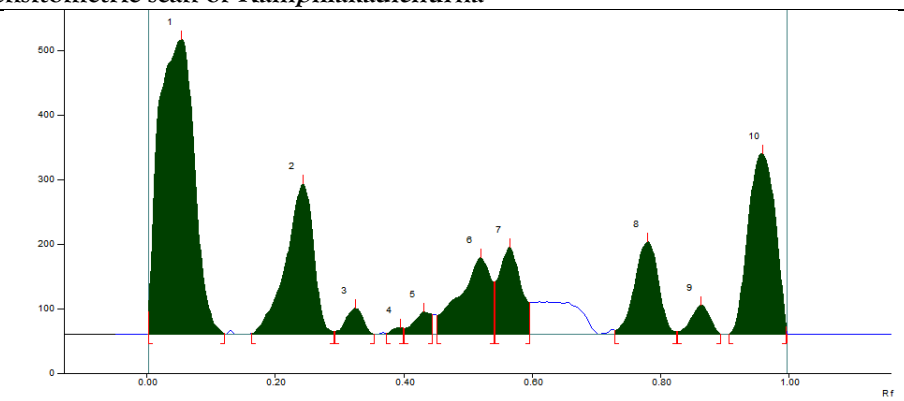
Track 1 - *Kampillakadichurna* – 3µl
Track 2 – *Kampillakadichurna* – 6µl
Track 3 - *Kampillakadichurna* – 9µl
Solvent system –Toluene: Ethyl Acetate: Formic acid (5.0: 4.0: 0.2) Rf - 0.52 (Quercetin)

Table 5: Rf values of sample of *Kampillakadichurna*

Short UV	Long UV
-	0.14 (F. blue)
0.19 (Green)	-
-	0.21 (F. blue)
0.26 (Green)	0.27 (F. green)
-	0.36 (F. blue)
0.43 (Green)	-
0.49 (Green)	0.49 (F. blue)
-	0.61 (F. green)
0.67 (Green)	-
-	0.69 (F. blue)
0.76 (Green)	-
0.85 (Green)	0.85 (F. blue)
0.91 (Green)	-

***F – Fluorescent; L –Light; D – Dark**

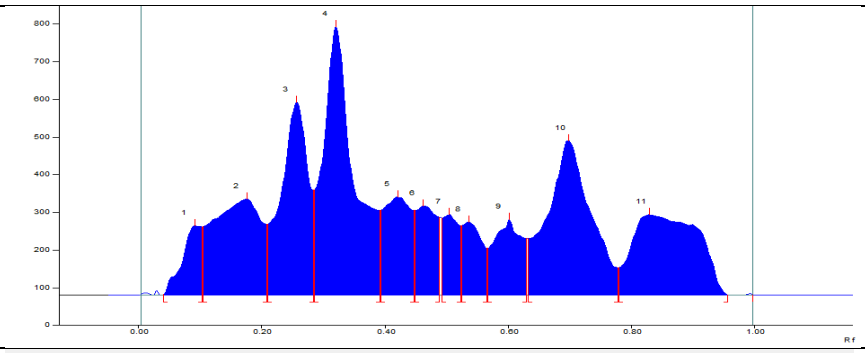
Figure 2: Densitometric scan of *Kampillakadichurna*



Track 3, ID: Kampillakadi churna

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	34.2 AU	0.05 Rf	455.9 AU	30.51 %	0.12 Rf	0.9 AU	18038.9 AU	38.19 %
2	0.16 Rf	1.1 AU	0.24 Rf	232.5 AU	15.56 %	0.29 Rf	4.2 AU	7116.8 AU	15.07 %
3	0.29 Rf	4.4 AU	0.33 Rf	40.4 AU	2.71 %	0.35 Rf	0.2 AU	772.0 AU	1.63 %
4	0.37 Rf	1.2 AU	0.40 Rf	10.5 AU	0.70 %	0.40 Rf	9.4 AU	125.3 AU	0.27 %
5	0.40 Rf	9.1 AU	0.43 Rf	35.4 AU	2.37 %	0.45 Rf	30.9 AU	671.2 AU	1.42 %
6	0.45 Rf	29.4 AU	0.52 Rf	118.5 AU	7.93 %	0.54 Rf	80.9 AU	4111.8 AU	8.71 %
7	0.54 Rf	81.5 AU	0.57 Rf	134.6 AU	9.00 %	0.60 Rf	49.3 AU	3256.6 AU	6.90 %
8	0.73 Rf	6.3 AU	0.78 Rf	142.5 AU	9.54 %	0.83 Rf	3.7 AU	3800.0 AU	8.05 %
9	0.83 Rf	3.8 AU	0.86 Rf	45.5 AU	3.04 %	0.90 Rf	0.4 AU	935.8 AU	1.98 %
10	0.91 Rf	0.5 AU	0.96 Rf	278.6 AU	18.64 %	1.00 Rf	11.4 AU	8401.6 AU	17.79 %

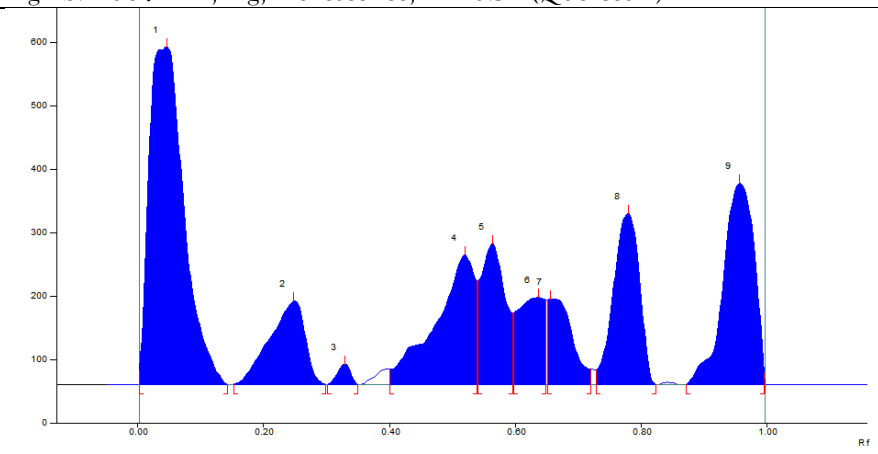
Fig 2a. At 254nm, Rf - 0.52 (Quercetin)



Track 3, ID: Kampillakadi churna

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.04 Rf	1.0 AU	0.09 Rf	183.9 AU	5.43 %	0.10 Rf	81.2 AU	4114.4 AU	3.25 %
2	0.10 Rf	181.5 AU	0.18 Rf	254.8 AU	7.52 %	0.21 Rf	87.7 AU	14243.1 AU	11.25 %
3	0.21 Rf	188.0 AU	0.26 Rf	510.9 AU	15.08 %	0.28 Rf	78.2 AU	16001.9 AU	12.64 %
4	0.29 Rf	278.5 AU	0.32 Rf	711.5 AU	21.00 %	0.39 Rf	25.0 AU	25724.6 AU	20.32 %
5	0.39 Rf	225.4 AU	0.42 Rf	259.5 AU	7.66 %	0.45 Rf	24.2 AU	8477.6 AU	6.70 %
6	0.45 Rf	224.4 AU	0.46 Rf	236.6 AU	6.98 %	0.49 Rf	06.9 AU	5622.0 AU	4.44 %
7	0.49 Rf	205.0 AU	0.50 Rf	213.3 AU	6.30 %	0.52 Rf	84.2 AU	4035.1 AU	3.19 %
8	0.53 Rf	184.4 AU	0.54 Rf	193.8 AU	5.72 %	0.57 Rf	24.1 AU	4408.3 AU	3.48 %
9	0.57 Rf	124.2 AU	0.60 Rf	201.1 AU	5.94 %	0.63 Rf	50.4 AU	6452.3 AU	5.10 %
10	0.63 Rf	150.9 AU	0.70 Rf	409.6 AU	12.09 %	0.78 Rf	72.7 AU	20783.6 AU	16.41 %
11	0.78 Rf	73.1 AU	0.83 Rf	213.0 AU	6.29 %	0.96 Rf	0.4 AU	16756.1 AU	13.23 %

Fig 2b. At 372nm, Hg, Flurescence, Rf - 0.52 (Quercetin)



Track 3, ID: Kampillakadi churna

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	21.8 AU	0.05 Rf	531.5 AU	26.87 %	0.14 Rf	0.3 AU	21197.5 AU	30.49 %
2	0.15 Rf	0.9 AU	0.25 Rf	131.0 AU	6.62 %	0.30 Rf	0.2 AU	5301.2 AU	7.62 %
3	0.30 Rf	0.2 AU	0.33 Rf	32.4 AU	1.64 %	0.35 Rf	0.5 AU	482.0 AU	0.69 %
4	0.40 Rf	23.9 AU	0.52 Rf	204.0 AU	10.32 %	0.54 Rf	63.6 AU	9115.7 AU	13.11 %
5	0.54 Rf	163.7 AU	0.56 Rf	221.7 AU	11.21 %	0.60 Rf	13.0 AU	6085.1 AU	8.75 %
6	0.60 Rf	113.5 AU	0.64 Rf	137.0 AU	6.93 %	0.65 Rf	33.5 AU	4265.6 AU	6.14 %
7	0.65 Rf	133.6 AU	0.66 Rf	134.6 AU	6.80 %	0.72 Rf	23.9 AU	3828.1 AU	5.51 %
8	0.73 Rf	23.6 AU	0.78 Rf	269.6 AU	13.63 %	0.82 Rf	0.1 AU	8004.3 AU	11.51 %
9	0.87 Rf	0.2 AU	0.96 Rf	316.2 AU	15.99 %	1.00 Rf	19.1 AU	11249.3 AU	16.18 %

Fig 2c. At 372nm, Hg, Absorption, Rf - 0.52 (Quercetin)

Sample of *Kampillakadichurna* has been analytically standardized as per standard testing protocol. HPTLC photo documentation, Rf values, densitograms are given in respective tables and figures. Rf - 0.52 (Quercetin) could be considered.

DISCUSSION

The preparation of *KampillakadiChurna* was found to be a simple, cost-effective process, making it suitable for large-scale pharmaceutical production. Ash value determination serves as an important parameter for assessing the purity and quality of crude drugs. In the present study, the formulation exhibited a total ash content of 8.06% and an acid-insoluble ash content of 1.945%, indicating minimal contamination with earthy or siliceous matter and confirming the authenticity of the raw materials.The presence of water-soluble ash2.04% suggested that the formulation possesses good solubility in aqueous media, which may enhance its bioavailability. Moisture analysis revealed a moisture content of 6.074%, while loss on drying was recorded at 6.00%, both within acceptable pharmacopoeial limits. Maintaining low moisture content is crucial, as higher values predispose formulations tomicrobial contamination and reduced shelf life.

The HPTLC fingerprinting of *KampillakadiChurna* showed eight distinct spots under short UV and eight spots under long UV, highlighting the presence of multiple phytoconstituents. This chromatographic profile can serve as a standardization tool for ensuring batch-to-batch consistency in future pharmaceutical preparations.

Preliminary phytochemical screening further validated the therapeutic potential of the formulation. Tests confirmed the presence of alkaloids, flavonoids, glycosides, steroids, terpenoids, tannins, and phenols. Each of these secondary metabolites is associated with distinct pharmacological activities; Alkaloids are known for their analgesic, anti-inflammatory, and antimicrobial effects.Flavonoids possess strong antioxidant and free-radical scavenging activity.Glycosides are often linked to cardioprotective and immunomodulatory properties. The combined presence of these bioactive compounds, along with favourable physicochemical characteristics, confirms that *KampillakadiChurna* exhibits the essential features of an ideal *Churna* formulation. The present findings not only establish preliminary standardization parameters but also provide a strong basis for future pharmacological validation and clinical research.

CONCLUSION

The present study demonstrated that the physicochemical and phytochemical parameters of *KampillakadiChurna* are consistent with the desirable qualities of an ideal *Churna* formulation,including acceptable ash values, low moisture content, and a characteristic HPTLC fingerprint with multiple phytoconstituents. Since specific API (Ayurvedic Pharmacopoeia of India) standards for this formulation are not yet available, the data generated in this work may serve as preliminary reference standards for future pharmaceutical standardization. Furthermore, the results provide a scientific basis that can support subsequent clinical investigations and validation of the therapeutic efficacy of *KampillakadiChurna*.

Acknowledgments

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REFERENCES

[1]Chakrapanidatta. Chakradatta, Vaidyaprabha Hindi Vyakhya by Indradev Tripathi, edited by Ramanath Dwivedi. Varanasi: Chaukhambha Sanskrit Bhawan; 2007. p.214.

[2]The Ayurvedic Pharmacopoeia of India, Part I. 1st ed. Vol. 2. Govt. of India, Department of Indian System of Medicine and Homoeopathy; 1999. p. 191.

[3]Indian Herbal Pharmacopoeia, Indian Drug Manufacturers' Association. Revised ed. 2002. pp. 493–4.

[4]Mukharjee PK. Quality Control of Herbal Drugs. New Delhi: Business Horizons Pharmaceutical Publishers; 2008. p. 189.