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QUALITY ASSESMENT OF *KRISHNAAGNYAADI CHURNA*: A PHARMACEUTICAL AND PHYTOCHEMICAL EVALUATION THROUGH PHYSICOCHEMICAL ANALYSIS AND HPTLC PROFILING

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ABSTRACT

Introduction: *Krishnagnyaadi Churna* is a classical herbal formulation mentioned in *Sahasrayoga (Churna Prakarana)*. It is primarily indicated in *Sopha* (edema/swelling). This study aims to evaluate the pharmaceutical and analytical characteristics of *Krishnagnyaadi Churna* to establish preliminary standardization data. **Materials and Methods:** The churna was prepared following traditional guidelines. Analytical parameters such as pH, loss on drying (LOD), water-soluble extractive, total ash, acid-insoluble ash, microbial contamination, and HPTLC fingerprinting were assessed. **Results:** Pharmaceutical analysis of the formulation yielded the following results: Loss on drying (LOD): 6.42% w/w, pH: 3.55,Total ash: 7.14% w/w, Acid-insoluble ash: 2.40% w/w, Water-soluble extractive: 41.25%w/w, Total bacterial count: 76 CFU/g, Total yeast and mold count: 12 CFU/g.

KEYWORDS: *Krishnagnyaadi churna*, *sopha*, pharmaceutical study, analytical parameter, quality control.

INTRODUCTION

Krishnagnyaadi Churna is a classical Ayurvedic formulation mentioned in *Sahasrayoga*

(*Churna Prakarana*) for managing *Sopha Roga* (edema/swelling).[1] The formulation contains key ingredients such as *Pippali, Chitraka, Vishwa, Musta, Jiraka, Devadaru, Pathya, Punarnava, Haridra, Maricha,* and *Anjada*. Despite its therapeutic significance, no scientific documentation has done on its method of preparation and analytical profile.

To address this gap, in the present study *Krishnagnyaadi Churna* was prepared following traditional methods and its physicochemical properties was evaluated to establish preliminary standardization data.

AIM

1) To prepare *Krishnagnyaadi Churna* following traditional methods.
2) To analyse its physicochemical and microbial properties for preliminary standardisation.

MATERIALS AND METHODS

Collection and authentication of raw drugs

As it is the foundational step in drug preparation, stringent measures were implemented:

All herbal ingredients were procured from Ambujam Ayurvedics, Udayamperoor, Thripunithura - a certified supplier.

Pharmaceutical-grade lime powder for *churnodaka preparation* was sourced from licensed vendors in Pariyaram market, Kannur.

Study setting

Raw material authentication: Dept of Dravyaguna Vijnana. Govt Ayurveda College, Kannur

Pharmaceutical study: Dept of R and B, Govt Ayurevda College, Kannur

Analytical study: Arya Vaidya Shala, Kottakkal, CARe Keralam Thrissur

Pharmaceutical study

The pharmaceutical study encompasses critical steps that transform raw medicinal materials into therapeutically effective formulations. Each stage significantly influences the research outcome, with particular emphasis on:

a) The quality of raw materials

b) The precision of preparation methodologies

Pharmaceutical study includes

1. Drug collection and authentication
2. Processing of raw materials

3. Preparation of *Krishnagnaaydi churna*

1. Drug collection and authentication

All raw materials were procured directly from certified cultivators following stringent quality checks. Each drug underwent botanical authentication prior to processing. Materials were carefully cleaned, shade-dried to preserve volatile constituents, and stored in sterile zip lock bags.

2. Processing of raw materials

All the raw materials were washed properly to remove external impurities and was dried under sunlight.

Purification process(*sodhana*)

Pre requisite procedure **:**Preparation of *churnodaka*

Churnodaka was prepared with classical ratio 1:240 of lime powder and water. For 4.8L litre of *churnodaka,* 20 gm lime powder was added in 4.8 litre of water. It was mixed well and was kept undisturbed for 12 hrs. After 12 hrs, clear water was obtained with lime powder sediment at the bottom. The supernatant liquid was strained through cotton cloth and the remaining lime powder was discarded.

Chitraka Sodhana

Roots of *Chitraka* was cut into small pieces. It was completely immersed in previously prepared *churnodaka* and kept till colour of the lime water turned pink in colour. The process was repeated for seven days till the intensity of pink colour was reduced. After that the *Chitraka* roots were washed in lukewarm water and was dried under shade.

Table no 1: Weight of *chitraka* before and after *sodhana.*

Sl	*Chitraka*	Weight
1	Before *sodhana*	230 gm
2	After *sodhana*	202 gm

Quality control measures

Strict anti-contamination protocols were implemented. All equipments were sterilized with boiled water. Stainless steel vessels were used for processing. *Churnodaka* was prepared fresh, for each day of sodhana as per *Rasatarangini* specifications.[2]

Environmental control measures

Shade-drying was maintained throughout to prevent loss of volatile compounds, fungal contamination and thermal degradation.

Images of pharmaceutical study

Fig 1 :*Churnodaka*

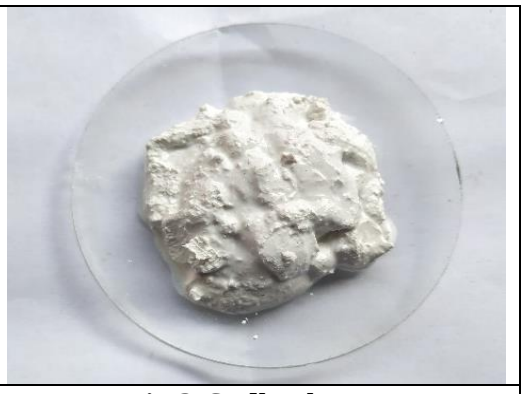


Fig 2:*Sudhachurna*

Fig 3 :*Chitraka* in *churnodaka*

Fig 4 :*Draining* of *churnodaka*

3. Preparation of *Krishnagnyaadi churna*

Table no. 2: Ingredients of *Krishnagnyaadi churna.*

Sl no	Name of the drug	Botanical name	Parts used	Quantity as per reference	Quantity used
1	*Krishna*	*Piper longum*	Fruit	1 part	28 gm
2	*Chitraka*	*Plumbago zeylanica*	Root	1 part	28 gm
3	*Viswa*	*Zingiber officinale*	Rhizome	1 part	28 gm
4	*Ghana*	*Cyperus rotundus*	Rhizome	1 part	28 gm
5	*Jiraka*	*Cuminum cyminum*	Seed	1 part	28 gm
6	*Devadaru*	*Cedrus deodara*	Heartwood	1 part	28 gm
7	*Pathya*	*Terminalia chebula*	Fruit rind	1 part	28 gm
8	*Punarnava*	*Boerhavia diffusa*	Root	1 part	28gm
9	*Nisha*	*Curcuma longa*	Rhizome	1 part	28 gm
10	*Maricha*	*Piper nigrum*	Fruit	1 part	28 gm
11	*Anjada*	*Phyllanthys niruri*	Root	1 part	28 gm

Reference

Sahasrayoga

Requirements

Weighing balance, Grinder, Spoon, Sieve with sieve number 85, steel vessels, storage bottles.

Procedure

- All the drugs were washed well and was dried under shade.
- *Devadaru* was cut into small pieces before powdering.
- *Chitraka sodhana* was done before powdering.
- All the drugs were separately powdered into fine powder using mixer grinder
- Powders were passed separately through sieve number 85.
- Powders were weighed separately, 28 gms each and stored in pre sterilised plastic containers.

Final formulation was prepared by geometric mixing of equal quantities of all powdered ingredients. Homogenization was achieved through sequential addition, progressive mixing and quality verification at each stage. Final product which weighed 300 gm was stored in airtight, sterile containers.

Fig. 5: Sieving of *devadaru churna*.

Fig. 6: Mixing of *churnas*.

Fig. 7: *Krishnagnyaadi churna.*

Analytical study

The analytical parameters like Loss on drying, Total ash, Acid insoluble ash, pH value, Water soluble extractive, Microbial analysis, Instrumental analysis - HPTLC were done.

OBSERVATION AND RESULTS

Table no. 3: Organoleptic characters of *Krishnagnyaadi churna.*

Sl no	Description	Characters
1	Colour	Yellowish brown powder
2	Odour	Pungent
3	Taste	Bitter
4	Consistency	Fine powder with smooth texture

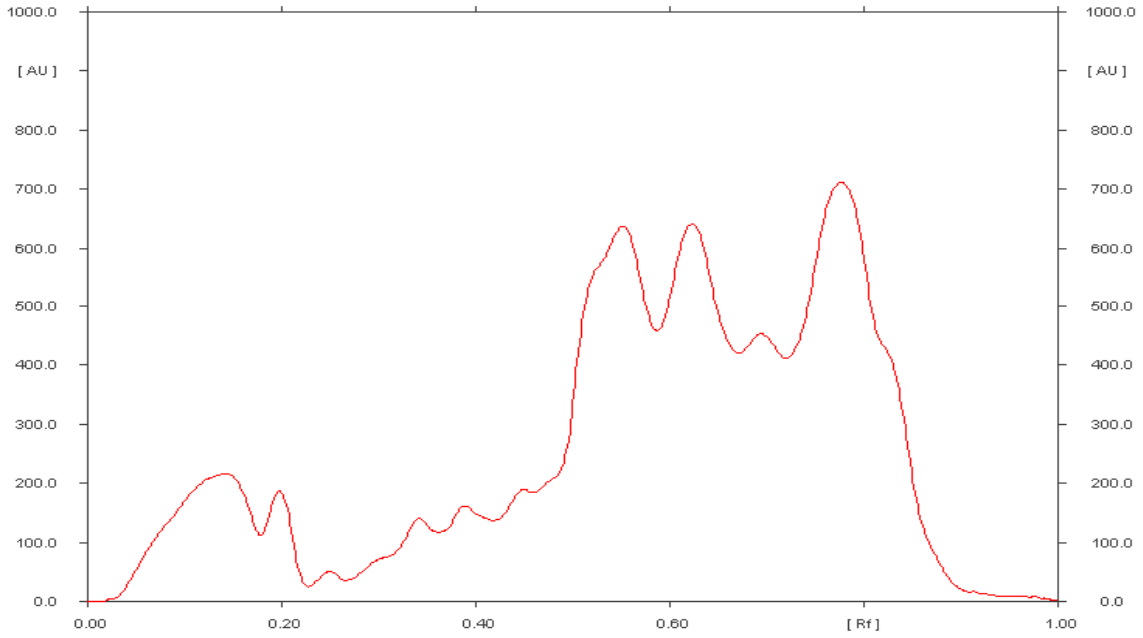
Physico chemical parameters of *Krishnagnyaadi churna*

Sl no	Test Parameter	Unit	Result
1	Loss on drying	% w/w	6.42
2	pH (10% aqueous solution)	-	3.55
3	Total ash	%w/w	7.14
4	Acid insoluble ash	%w/w	2.40
5	Water soluble extractive	% w/w	41.25

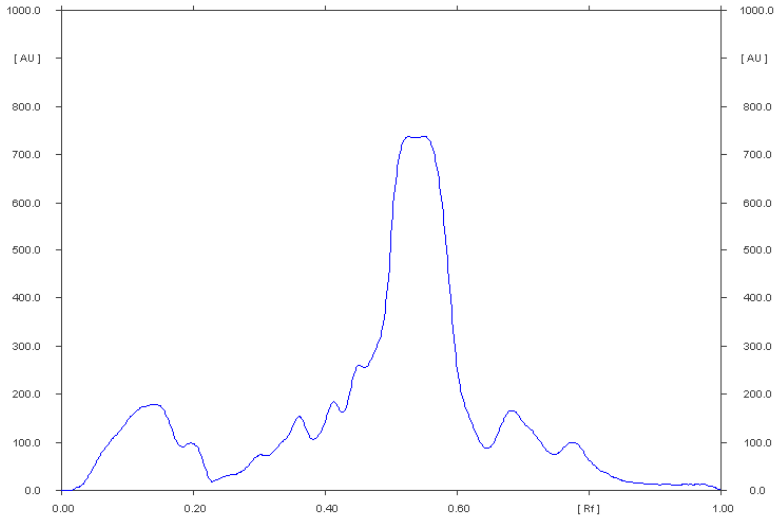
Table 4: Tests for microbial contamination.

Parameters	Unit	Result	Specification	Test Method
Total plate count for bacteria	CFU/g	76,000	10^5	API, Part 2 vol3
Total yeast and mold count	CFU/g	12,000	10^3	API, Part 2 vol 3

HPTLC Analysis of *Krishnagnyaadi churna*



Graph 1: Overview graph of *Krishnagnyaadi churna* sample at 254nm.



Graph 2: Overview graph of *Krishnagnyaadi churna* sample at 366nm.

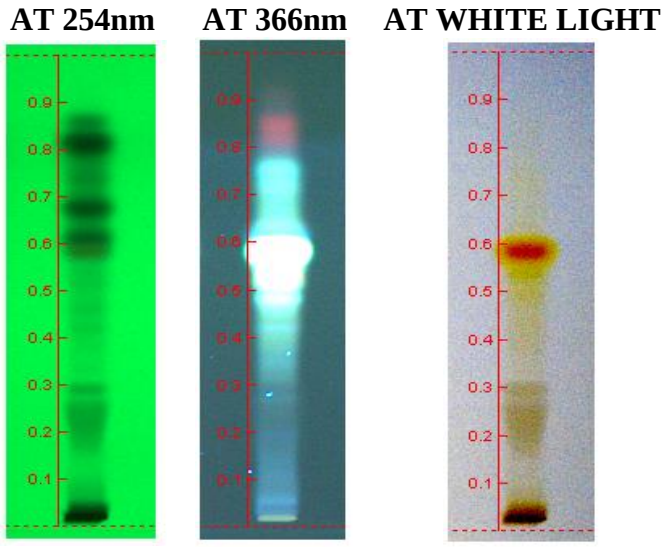


Fig 8: TLC plate views of *Krishnagnyaadi churna* sample.

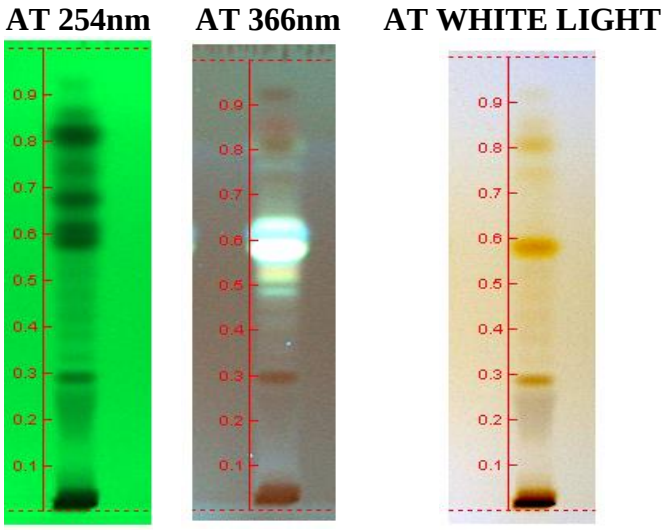


Fig. 9: Derivatized TLC plate views of *Krishnagnyaadi churna* sample.

Table 5: Rf value & % area of *Krishnagnyaadi churna* sample at 254nm.

Peak no	Rf value	Area(au)	% Area(au)
1	0.14	16496.8	8.55
2	0.20	4626.0	2.40
3	0.25	1221.9	0.63
4	0.34	6630.6	3.44
5	0.39	6135.9	3.18
6	0.45	5346.4	2.77
7	0.55	44560.9	23.11
8	0.62	35183.8	18.24
9	0.69	16512.1	8.57
10	0.78	56144.3	29.11

Total peak no – 10

Total area – 192858.7 (AU)

Table 6: Rf value & % area of *Krishnagnyaadi churna* sample at 366nm.

Peak no	Rf value	Area(au)	% Area(au)
1	0.14	14495.8	12.27
2	0.20	2555.3	2.16
3	0.30	2891.0	2.45
4	0.36	6218.7	5.27
5	0.41	5274.4	4.47
6	0.45	5877.4	4.98
7	0.53	31704.1	26.84
8	0.55	34151.3	28.91
9	0.68	9811.1	8.31
10	0.77	5130.2	4.34

Total peak number 10

Total area -118109.3 (AU)

DISCUSSION

The preparation of *Krishnaagnyaadi Churna* in this study followed a stringent protocol to ensure authenticity, purity, and therapeutic efficacy. The raw drugs were sourced from certified cultivators and subjected to thorough authentication, minimizing the risk of adulteration—a critical concern in herbal drug standardization (Patra et al., 2018).[3] Shade-drying preserved volatile constituents, which are often degraded by direct sunlight, thereby maintaining phytochemical integrity (Kumari et al., 2020).[4]

Purification (*Sodhana*) of *Chitraka*: Safety and Standardization

The *sodhana* (purification) of *Chitraka* (Plumbago zeylanica) in *churnodaka* (a traditional medium) for seven days aligns with classical *Rasatarangini* guidelines. The fading of the pinkish hue in *churnodaka* indicates the reduction of plumbagin, a toxic constituent

associated with hepatotoxicity (Joshi et al., 2010).[5] This detoxification step enhances the safety profile of *Chitraka* without compromising its therapeutic properties, as evidenced in prior pharmacognostic studies (Singh et al., 2019).[6] Hot water washing further eliminated residual impurities, ensuring compliance with Ayurvedic *shodhana* principles.

Controlled Processing for Phytochemical Stability

The use of sterilized steel utensils and daily preparation of *churnodaka* prevented microbial contamination, a common issue in herbal preparations (WHO, 2018).[7] Sieving (No. 85 mesh) ensured uniform particle size, facilitating better absorption and batch consistency—a key factor in reproducibility (EMA, 2015).[8] Storage in pre-sterilized containers minimized oxidative degradation, preserving bioactive compounds.

Homogeneity and Therapeutic Optimization

The stepwise mixing of individual powders ensured homogeneity, critical for dose uniformity in polyherbal formulations (Chaudhary et al., 2021).[9] This method adheres to Good Manufacturing Practices (GMP) while retaining traditional Ayurvedic protocols, bridging classical knowledge with modern quality control.

The present study systematically evaluated the quality parameters of *Krishnaagnyaadi Churna* through organoleptic, physicochemical, and chromatographic analyses, adhering to Ayurvedic Pharmacopoeia of India (API) standards. The findings provide valuable insights into purity, stability, and potential therapeutic efficacy of the formulation while highlighting areas for further investigation.

Organoleptic and Physicochemical Characterization

The yellowish-brown colour, pungent odour, and bitter taste of *Krishnaagnyaadi Churna* align with classical Ayurvedic descriptions, suggesting proper preparation and retention of active constituents. The fine powder consistency ensures uniformity, facilitating better absorption and dosing accuracy.

Key physicochemical parameters were within API limits, confirming the formulation's quality

Loss on Drying (LOD, 6.42% w/w) indicates acceptable moisture content, minimizing microbial growth and chemical degradation (WHO, 2018).[10]

Acidic pH (3.55) may influence drug solubility and absorption, particularly in gastric

environments, though its impact on bioavailability warrants further study (Patel et al., 2020).[11]

Total Ash (7.14% w/w) and Acid-Insoluble Ash (2.40% w/w) values reflect low silicate impurities, affirming minimal adulteration (EMA, 2015).[12]

High Water-Soluble Extractive Value (41.25% w/w) suggests a substantial presence of polar bioactive compounds, correlating with therapeutic potential (Kumari et al., 2021).[13]

Microbial Contamination and Safety

Microbial load (76,000 CFU/g bacteria; 12,000 CFU/g yeast/mould) was assessed, though comparisons with API limits for similar formulations to confirm safety. Sterilization techniques during preparation (e.g., shade-drying, sterile storage) has likely mitigated excessive contamination, (Chaudhary et al., 2021).[14] But future studies should include pathogen-specific tests (e.g., E. coli, Salmonella).

HPTLC Profiling and Phytochemical Insights

HPTLC analysis revealed 10 distinct peaks at 254 nm and 366 nm, with key Rf values (0.14, 0.20, 0.45, 0.55) serving as potential markers for standardization. The prominent peaks (Rf 0.78 at 254 nm; Rf 0.55 at 366 nm) indicate dominant compounds, possibly alkaloids or phenolics, given their UV absorption characteristics (Joshi et al., 2019).[15] However, the lack of quantitative identification limits mechanistic interpretations.

Future studies should isolate and characterize peaks using LC-MS or NMR and correlate Rf values with bioactivity (e.g., antioxidant, anti-inflammatory) assays.

Limitations and Future Directions

Individual Drug Analysis: Absence of constituent-wise profiling precludes comparative potency assessment.

Bioactive Quantification: Total phenolics, flavonoids, or marker compounds (e.g., plumbagin post-sodhana) should be quantified.

CONCLUSION

This study was focused on the pharmaceutical and analytical profile of *Krishnagnyaadi churna*. *Churna* was yellowish brown in colour with a pungent odour and bitter taste. It had smooth texture. Detailed analytical study along with test for microbial contamination and

HPTLC profiling was done.Since there is no standard profile regarding the formulation, results of this study will serve as reference for standardisation.

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