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PHYSICOCHEMICAL CHARACTERIZATION AND CHROMATOGRAPHIC (TLC & HPTLC) ANALYSIS OF SIDDHA POLYHERBAL FORMULATION SIRAKAMBAVATHATHIRKKU KUDINEER

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ABSTRACT :

BACKGROUND: Siddha polyherbal formulations play a vital role in traditional healthcare. However, scientific validation is necessary to ensure their safety, purity, and efficacy.

OBJECTIVE: This study aims to standardize the Siddha formulation Sirakambavathathirkku Kudineer (STK) through physicochemical evaluation and chromatographic (TLC & HPTLC) fingerprinting.

METHODS: The formulation was analyzed for physicochemical parameters such as loss on drying, total ash, acid-insoluble ash, water-soluble ash, extractive values, and pH following the PLIM guidelines. TLC and HPTLC analyses were performed using silica gel plates and optimized solvent systems, and visualized under UV/derivatized conditions.

RESULTS: Physicochemical parameters were within permissible limits, ensuring good quality. TLC showed distinct spots with Rf values ranging from 0.00 to 0.56 at 366 nm. HPTLC fingerprinting displayed unique peaks indicating marker compounds.

CONCLUSION: The combined physicochemical and chromatographic findings establish a standardization profile for SKK, supporting its identity and purity.

KEYWORDS: Siddha, Standardization, Physicochemical analysis, TLC, HPTLC, Sirakambavathathirkku Kudineer.

INTRODUCTION

The Siddha system of medicine, an ancient traditional system originating from South India, emphasizes holistic healing using polyherbal formulations. Sirakambavathathirkku Kudineer (STK) is a classical Siddha formulation prescribed for sirakambavatham (cerebral palsy). However, variability in raw materials and preparation techniques necessitates proper standardization.

Standardization through physicochemical and chromatographic analysis ensures consistency, safety, and therapeutic efficacy. According to WHO and AYUSH guidelines,(1) parameters like ash values, extractive values, and pH serve as essential indicators of quality. Chromatographic methods such as Thin Layer Chromatography (TLC) and High-Performance Thin Layer Chromatography (HPTLC) provide fingerprint profiles useful for authentication and quality control of herbal medicines.

MATERIALS AND METHODS

The formulation STK was prepared as per classical Siddha text Agathiyar Vaithiya Sindhamani. All ingredients were authenticated and processed according to Siddha text Sigicha rathna Deepam.

Physicochemical Analysis: The following parameters were evaluated(2)
- Loss on drying (at 105°C)
- Total ash

- Acid-insoluble ash
- Water-soluble ash
- Alcohol-soluble extractive
- Water-soluble extractive
- pH (4,5)

Chromatographic Studies:

Thin Layer Chromatography (TLC) was performed on silica gel 60 F_{254} plates (7 × 6 cm, Merck) using an optimized solvent system. The developed chromatograms were visualized under short-wave ultraviolet (UV) light at 254 nm and long-wave UV light at 365 nm to observe the separated phytoconstituents. [6]

High-Performance Thin Layer Chromatography (HPTLC) analysis was conducted using a CAMAG twin trough chamber. Sample elution was carried out based on the adsorption characteristics of the components. The developed plates were scanned at 366 nm, and the chromatographic data were captured and integrated using CAMAG software. The presence of various phytochemicals was confirmed, and their respective Rf values were documented and tabulated. [8,9]

RESULTS AND DISCUSSION

The sirakambavathathirkku kudineer was observed to be brownish fibrous solid with a characteristic odour and hard consistency. their formulation exhibited non free flowing nature. Solublity analysis revealed that the sample was soluble in water,ethanol&dmso,while it was insoluble in chloroform and ethyl acetate.physiochemical charecters such as loss on drying at 105'c is *7.56 ± 0.30 Total ash % is 3.1 ± 0.2,acid insoluble ash % is0 ± 0,water soluble extractive% is 14.8 ± 0.52,alcohol soluble extractive % is 6.5 ± 0.4 ,pH is 7.42*Physicochemical results revealed that the formulation meets standard quality requirements.(3) Moisture content was within limits, indicating stability. Ash and extractive values confirmed the presence of desirable phytoconstituents. The pH values indicated the formulation's suitability for internal administration.[7]

TLC analysis revealed bands at 366 nm, serving as unique identifiers for STK. HPTLC analysis produced distinct peaks representing marker compounds, with Rf values ranging from 0.00 to 0.56,confirming formulation authenticity and reproducibility.

These findings reinforce the importance of combining physicochemical and chromatographic evaluations for establishing the identity, purity, and quality of Siddha formulations such as STK.

Figure 1: TLC Profile of Sirakambavathathirkku Kudineer at 366 nm

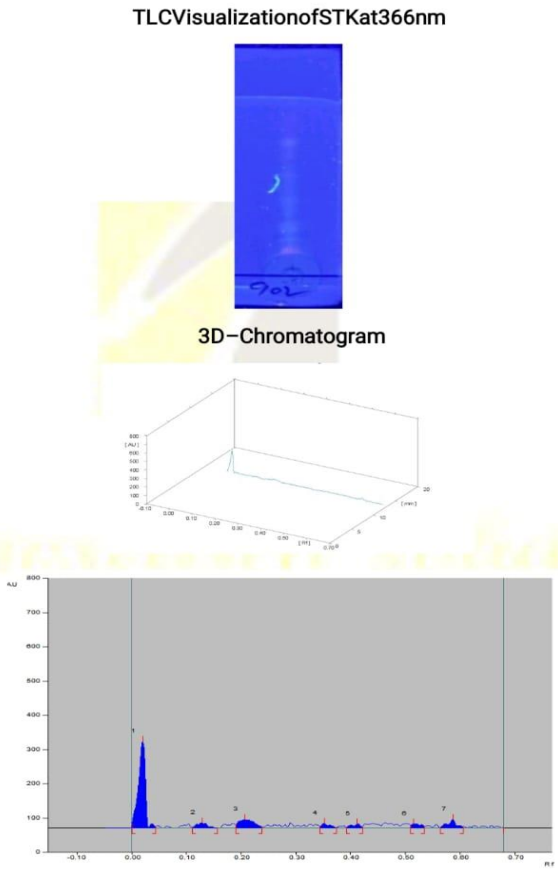
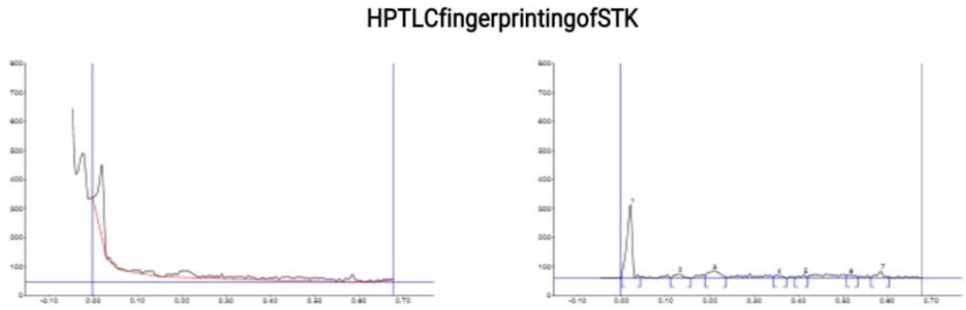


Figure 2: HPTLC Chromatogram of Sirakambavathathirkku Kudineer (STK)



PeakTable

Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %
1	0.00	11.8	0.02	253.2	71.47	0.04	3.8	2318.3	61.00
2	0.11	1.2	0.13	14.8	4.17	0.16	0.2	211.3	5.56
3	0.19	8.7	0.21	24.6	6.94	0.24	4.0	530.0	13.95
4	0.34	5.1	0.35	12.6	3.57	0.37	0.9	143.7	3.78
5	0.39	1.3	0.41	11.6	3.27	0.42	3.7	131.4	3.46
6	0.51	8.8	0.52	12.2	3.46	0.54	5.6	169.4	4.46
7	0.56	1.1	0.59	25.2	7.11	0.61	3.8	296.3	7.80

CONCLUSION

The physicochemical and chromatographic (TLC & HPTLC) analyses of STK established its quality parameters and fingerprint profile. These findings contribute to the preliminary standardization of the formulation, ensuring its reproducibility and reliability for future pharmacological validation and clinical use.

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