



Research Article

STANDARDIZATION AND QUALITY EVALUATION OF THE SIDDHA HERBAL FORMULATION
SEVIYA VADAGAM (SV) THROUGH SPECTROSCOPIC AND CHROMATOGRAPHIC TECHNIQUES

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Hepatoprotective
formulation.

ABSTRACT

Seviya Vadagam (SV) is a traditional Siddha medicine widely indicated for the management of jaundice and hepatic disorders. Although its clinical use is well established, scientific validation using advanced instrumental techniques is essential to define quality control standards. The present study aimed to standardize SV using High-Performance Thin-Layer Chromatography (HPTLC), Fourier Transform Infrared Spectroscopy (FTIR) and Inductively Coupled Plasma Optical Emission Spectroscopy (ICPOES). HPTLC fingerprint profiling revealed a distinct fingerprint pattern for the formulation, ensuring reproducibility and authentication. FT-IR analysis identified the presence of characteristic functional groups corresponding to phytoconstituents. ICP-OES analysis demonstrated that arsenic, cadmium, and mercury were below the limit of quantification, while lead content remained within the permissible safety limits prescribed by regulatory standards. The findings collectively establish instrumental quality parameters for *Seviya Vadagam* and scientifically support its safety, authenticity, and potential therapeutic application in liver-related disorders while facilitating future pharmacological and clinical research.

INTRODUCTION

Traditional Siddha formulations have been widely used for centuries in the management of various chronic and metabolic disorders. However, scientific validation and standardization of these formulations are essential to ensure their authenticity, quality, safety, efficacy, and reproducibility. Recent advancements in analytical instrumentation have enabled comprehensive characterization of herbal medicines through precise qualitative and quantitative evaluation. Modern techniques such as High-Performance Thin-Layer Chromatography (HPTLC), Fourier Transform Infrared Spectroscopy (FTIR) and Inductively Coupled Plasma Optical Emission Spectroscopy (ICPOES) are increasingly employed in herbal drug research for generating reproducible fingerprints and evaluating elemental safety profiles. Among Siddha formulations, SV has long been used for the treatment of jaundice and other hepatic disorders.

However, its complex composition poses challenges for conventional evaluation. Instrumental analytical techniques provide a scientific approach for identifying phytochemical constituents, detecting characteristic functional groups, and assessing heavy metal contamination. Therefore, the present study was undertaken to standardize *Seviya Vadagam* using advanced spectroscopic and chromatographic techniques. Establishing such analytical quality parameters will not only support the authenticity and safety of the formulation but also facilitate its acceptance in evidence-based traditional medicine research and regulatory frameworks.

AIM

To standardize and validate *Seviya vadagam* (SV) using advanced analytical techniques for establishing quality control and evaluate its safety for therapeutic use in liver disorders.

OBJECTIVES

1. To prepare *Seviya Vadagam* (SV) according to the classical Siddha text- "*Aathmarakshamirtham vaiththiya saara sangiragam*".
2. To develop the HPTLC fingerprint profile of SV.
3. To identify functional groups using FTIR analysis.
4. To determine elemental composition using ICP-OES.

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5. To establish instrumental quality control parameters for standardization of SV.

Dosage: *Paakkalavu* (approximately 5 g)

Route: Oral Administration

MATERIALS AND METHODS

Drug Profile^[1]

Drug name: *Seviya Vadagam* (SV)

Indications: *Kaamalai, Sogai, Veekkam, Vaayu, Vikkal, Vaanthi, Akkini mantham, Nenjerivu, Kirani, Irumal*

Ingredients

Table 1: Ingredients and Botanical name of *Seviya Vadagam* (SV) ^[1]

S.No	Tamil Name	Botanical Name	Quantity
1	Seviyam (Milagu ver)	<i>Piper nigrum</i>	1 Palam (35g)
2	Iluppai poo	<i>Madhuca longifolia</i>	1 Palam (35g)
3	Thippili moolam	<i>Piper longum</i>	1 Palam (35g)
4	Vilamicham ver	<i>plectranthus vettiveroides</i>	1 Palam (35g)
5	Sukku	<i>Zingiber officinale</i>	1 Palam (35g)
6	Nilavembu	<i>Andrographis paniculata</i>	1 Palam (35g)
7	Adhimadhuram	<i>Glycyrrhiza glabra</i>	1 Palam (35g)
8	Neithar kizhangu	<i>Nymphaea nouchali</i>	1 Palam (35g)
9	Vettiveru	<i>Vetiveria zizanioides</i>	1 Palam (35g)
10	Santhanam	<i>Santalum album</i>	1 Palam (35g)
11	Elavangam	<i>Syzygium aromaticum</i>	1 Palam (35g)
12	Elavangapattai	<i>Cinnamomum verum</i>	1 Palam (35g)
13	Nagesaram	<i>Mesua ferrea</i>	1 Palam (35g)
14	Ealam	<i>Elettaria cardamomum</i>	1 Palam (35g)
15	Milagu	<i>Piper nigrum</i>	1 Palam (35g)
16	Thalisapaththiri	<i>Abies spectabilis</i>	1 Palam (35g)

Collection and Authentication of raw drugs

The raw drugs were bought from authenticated country store in Chennai. All the ingredients were authenticated by Gunapadam (Siddha Pharmacology) experts and Botanist of Government Siddha Medical College (GSMC), Chennai.

Purification and Preparation of *Seviya Vadagam* (SV) ^[1&2]

All the ingredients will be purified according to the Siddha literature – *Sigicha rathna dheepam ennum vaiththiya nool*.

All purified ingredients were individually pulverized into fine powders and subsequently combined to form a homogeneous mixture. An equal proportion of jaggery was then incorporated and thoroughly triturated with the powdered blend. The final formulation was divided into *Paakkalavu* units, each weighing approximately 5 g. This deposited substance was carefully collected and stored in a clean, dry container for subsequent standardizing procedures.



Figure 1



Figure 2

Analytical Instrumentation Techniques - Methodology

Sample preparation for TLC one gram sample was sonicated in 10ml of ethanol for 15 minutes and then filtered. This solution was used for TLC.

TLC/HPTLC Methodology

Applied 15, 20 μ l of sample extract on TLC plate using Camag's ATS4 applicator and developed by the Mobile phase: Toluene: Ethyl acetate: Acetic acid (9:1:0.5, v/v) up to 8cm distance. After development, the plate was photo documented using Camag's TLC Visualizer under UV 254nm and UV 366nm. Scanned the plate using Camag's Scanner 4 at UV 254nm (D 2 lamp/Absorption mode) finger print profiles of the extract were documented. Then the plate was dipped in vanillin-sulphuric acid reagent followed by heating at 105°C till development of coloured spots. The plate was then photo documented in white light and scanned at 520nm (W lamp/Absorption mode)

FTIR analysis (functional groups identification) Methodology^[3,4]

Fourier Transform Infrared (FTIR) analysis was carried out to identify the functional groups present in the sample following standard procedures reported in similar studies. The sample was dried, finely powdered, and a small quantity was mixed with potassium bromide (KBr) and compressed into a thin pellet (or analyzed directly using ATR mode). The spectrum was recorded using an FTIR spectrophotometer over the range of 4000–400 cm^{-1} at a resolution of about 4 cm^{-1} with multiple scans to ensure accuracy. A background spectrum was obtained prior to analysis. The resulting absorption peaks were

interpreted based on characteristic wavenumbers corresponding to different functional groups such as hydroxyl, carbonyl, alkane, alkene, and amine groups, and the obtained spectral data were compared with standard references to determine the chemical constituents present in the sample.

ICP-OES analysis (elemental composition, safety limits) Methodology^[5]

The heavy metals in the sample were analyzed using Inductively Coupled Plasma–Optical Emission Spectrometry (ICP-OES) following AOAC Official Methods of Analysis (22nd Ed., 2023). Approximately 0.5–1.0g of the sample was accurately weighed and subjected to acid digestion using concentrated nitric acid and hydrogen peroxide in a microwave digestion system until a clear solution was obtained. The digested sample was cooled, diluted to a known volume with deionized water, and filtered if necessary. Calibration standards were prepared from multi-element standard solutions, and a blank was used for baseline correction. The prepared solutions were introduced into the ICP-OES instrument, where elements such as arsenic (As), cadmium (Cd), mercury (Hg), and lead (Pb) were quantified based on their characteristic emission wavelengths. Quality control measures including blanks and standard checks were employed to ensure accuracy. Results were expressed in mg/kg, and values below the limit of quantification were reported as BLQ, with limits of quantification set at 2.0mg/kg for As, 0.1 mg/kg for Cd, 1.0mg/kg for Pb, and 0.5mg/kg for Hg.

RESULTS

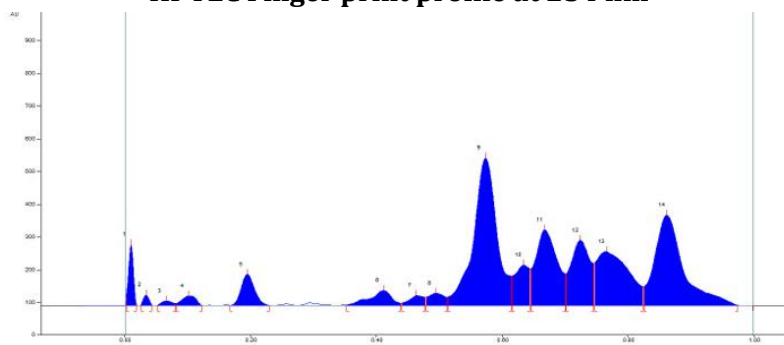
TLC Photo documentation

UV 254 nm		UV 366 nm		Derivatized	
R _f value	Color	R _f value	Color	R _f value	Color
0.09	Green	0.11	Blue	0.10	Purple
0.19	Green	0.19	Blue	0.19	Blue
0.56	Green	0.26	Green	0.37	Purple
0.61	Green	0.29	Pink	0.52	Purple
0.66	Green	0.34	Blue	0.57	Green
0.71	Green	0.37	Pink	0.71	Blue
0.85	Green	0.40	Pink	0.78	Red
		0.45	Blue	0.83	Blue
		0.56	Aqua	0.86	Yellow
		0.67	Green	0.90	Blue
		0.72	Pink		
		0.76	White		
		0.80	Pink		
		0.84	Pink		
		0.89	Pink		

TLC profile

Multiple spots with different R_f values indicating the presence of both polar and non-polar compounds. Fluorescent spots observed under UV 366 nm and characteristic color development after derivatization suggested the presence of phytoconstituents such as flavonoids, phenolics, alkaloids, terpenoids, and glycosides. The variation in R_f values indicates a wide range of polarity, confirming the heterogeneity of the sample.

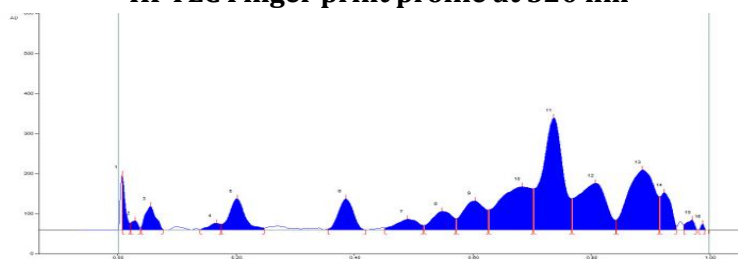
HPTLC Finger print profile at 254 nm



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	25.0 AU	0.01 Rf	186.3 AU	9.72 %	0.02 Rf	5.9 AU	1254.2 AU	2.30 %
2	0.03 Rf	3.4 AU	0.03 Rf	32.2 AU	1.68 %	0.04 Rf	1.9 AU	258.8 AU	0.47 %
3	0.05 Rf	0.6 AU	0.07 Rf	14.1 AU	0.74 %	0.08 Rf	6.7 AU	213.4 AU	0.39 %
4	0.08 Rf	7.0 AU	0.10 Rf	29.0 AU	1.51 %	0.12 Rf	0.3 AU	572.9 AU	1.05 %
5	0.17 Rf	0.3 AU	0.20 Rf	95.8 AU	5.00 %	0.23 Rf	0.3 AU	1769.2 AU	3.25 %
6	0.35 Rf	2.1 AU	0.41 Rf	45.3 AU	2.37 %	0.44 Rf	7.2 AU	1408.8 AU	2.59 %
7	0.44 Rf	7.4 AU	0.46 Rf	30.2 AU	1.57 %	0.48 Rf	25.6 AU	619.9 AU	1.14 %
8	0.48 Rf	25.7 AU	0.50 Rf	37.6 AU	1.96 %	0.51 Rf	25.5 AU	822.5 AU	1.51 %
9	0.51 Rf	26.2 AU	0.57 Rf	450.8 AU	23.52 %	0.62 Rf	90.4 AU	14682.7 AU	26.94 %
10	0.62 Rf	90.7 AU	0.63 Rf	123.2 AU	6.43 %	0.65 Rf	12.1 AU	2434.3 AU	4.47 %
11	0.65 Rf	112.3 AU	0.67 Rf	231.7 AU	12.09 %	0.70 Rf	96.8 AU	6885.7 AU	12.64 %
12	0.70 Rf	97.4 AU	0.73 Rf	199.4 AU	10.40 %	0.75 Rf	29.0 AU	5263.9 AU	9.66 %
13	0.75 Rf	130.0 AU	0.77 Rf	164.6 AU	8.59 %	0.83 Rf	57.4 AU	7345.4 AU	13.48 %
14	0.83 Rf	57.9 AU	0.86 Rf	276.3 AU	14.42 %	0.98 Rf	1.0 AU	10961.1 AU	20.11 %

HPTLC densitometric profile at 254nm shows the presence of 14 peaks indicating multiple phytoconstituents in the sample. The major peaks observed at R_f values around 0.62, 0.83, 0.70, and 0.77 with high area percentages suggest the presence of dominant chemical constituents. The wide range of R_f values (0.01–0.85) indicates compounds of varying polarity, confirming the complex nature of the formulation. The densitometric analysis confirms the presence of both major and minor components, which can be used as a fingerprint for identification and quality control of the sample.

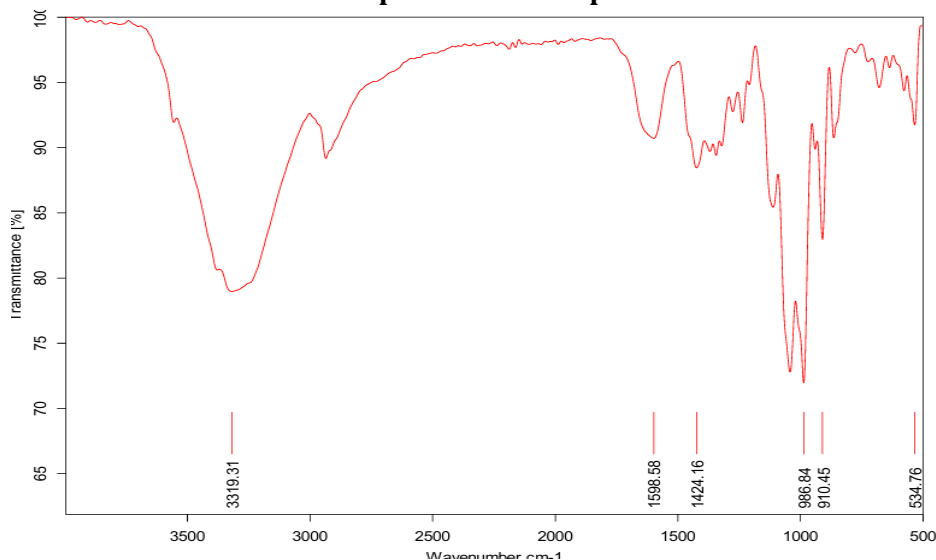
HPTLC Finger print profile at 520 nm



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	137.6 AU	0.01 Rf	137.6 AU	10.43 %	0.02 Rf	16.5 AU	678.5 AU	1.90 %
2	0.02 Rf	17.2 AU	0.03 Rf	22.0 AU	1.67 %	0.04 Rf	5.4 AU	222.1 AU	0.62 %
3	0.04 Rf	5.8 AU	0.06 Rf	59.4 AU	4.50 %	0.08 Rf	0.5 AU	904.1 AU	2.53 %
4	0.14 Rf	0.5 AU	0.17 Rf	16.4 AU	1.24 %	0.17 Rf	14.0 AU	265.6 AU	0.74 %
5	0.18 Rf	14.0 AU	0.20 Rf	77.6 AU	5.89 %	0.25 Rf	4.4 AU	1751.9 AU	4.91 %
6	0.36 Rf	2.3 AU	0.39 Rf	76.9 AU	5.83 %	0.42 Rf	0.1 AU	1647.5 AU	4.61 %
7	0.45 Rf	4.9 AU	0.49 Rf	26.4 AU	2.00 %	0.52 Rf	10.9 AU	844.4 AU	2.37 %
8	0.52 Rf	11.1 AU	0.55 Rf	45.8 AU	3.47 %	0.57 Rf	28.1 AU	1359.5 AU	3.81 %
9	0.57 Rf	28.2 AU	0.61 Rf	72.1 AU	5.46 %	0.63 Rf	49.4 AU	2301.5 AU	6.45 %
10	0.63 Rf	49.8 AU	0.68 Rf	107.5 AU	8.15 %	0.70 Rf	02.9 AU	5058.9 AU	14.17 %
11	0.70 Rf	102.8 AU	0.74 Rf	279.5 AU	21.19 %	0.77 Rf	77.7 AU	8314.4 AU	23.29 %
12	0.77 Rf	77.9 AU	0.81 Rf	115.8 AU	8.78 %	0.84 Rf	24.4 AU	4769.4 AU	13.36 %
13	0.84 Rf	24.7 AU	0.89 Rf	149.6 AU	11.34 %	0.92 Rf	83.0 AU	5766.1 AU	16.15 %
14	0.92 Rf	83.0 AU	0.92 Rf	93.0 AU	7.05 %	0.95 Rf	8.4 AU	1458.2 AU	4.08 %
15	0.96 Rf	13.2 AU	0.97 Rf	24.8 AU	1.88 %	0.98 Rf	2.6 AU	293.4 AU	0.82 %
16	0.98 Rf	0.0 AU	0.99 Rf	14.7 AU	1.11 %	0.99 Rf	3.1 AU	65.4 AU	0.18 %

HPTLC densitometric profile at 520nm shows the presence of 16 peaks, indicating a complex mixture of phytoconstituents. The major peaks at R_f values around 0.77, 0.92, 0.70, and 0.84 with high area percentages suggest dominant chemical constituents. The wide R_f range (0.01–0.99) indicates the presence of compounds with varying polarity from polar to non-polar. The increased number of peaks compared to earlier profiles suggests enhanced detection of compounds, possibly due to derivatization or different detection wavelength. This fingerprint can be used for identification, standardization, and quality control of the sample.

FT-IR Spectrum of Sample SV



FT-IR Peak Table Report

The FTIR analysis of the polyherbal sample SV reveals the presence of key functional groups indicative of bioactive compounds. The broad O-H stretch (3319.31 cm^{-1}) suggests phenols / alcohols, C-H stretching ($\sim 3000\text{--}2850$) suggests alkanes (aliphatic chains) and C=C stretching (1598.58) suggests aromatic ring / conjugated alkenes. The presence of C-H bending / skeletal vibration (1424.16) suggests aromatic compounds/alkanes, =C-H bending (out-of-plane) (986.84) suggests alkenes, =C-H bending (out-of-plane) (910.45) suggests Vinyl or substituted alkenes and C-X stretching (534.76) suggests halogen compounds / inorganic residues

Heavy Metal Analysis

S.No	Element	Results (mg/kg)	Limit of quantification (mg/kg)
1.	Arsenic (As)	BLQ	2.0
2.	Cadmium (Cd)	BLQ	0.1
3.	Mercury (Hg)	BLQ	0.5
4.	Lead (Pb)	1.795	1.0

BLQ- Below the limit of Quantification

Report: The ICP-OES results clearly showed that arsenic, cadmium, and mercury were below detectable limits, whereas lead was detected at 1.795mg/kg, which falls within the permissible safety limit. The detected lead concentration was within the permissible safety limit of 10mg/kg prescribed by the Ayurvedic Pharmacopoeia of India, indicating that the formulation is safe for internal administration.

DISCUSSION

The present study employed advanced analytical techniques to scientifically standardize the Siddha formulation *Seviya Vadagam* (SV). Each instrumental method provided complementary data supporting the formulation's chemical complexity, structural characteristics, and safety profile.

Thin Layer Chromatography (TLC) analysis of SV revealed multiple distinct spots at varying R_f values, confirming the polyherbal nature of the formulation. The clear separation of spots indicated the presence of diverse phytochemical constituents with different polarities, serving as a preliminary fingerprint for identification and quality assessment.

High-Performance Thin Layer Chromatography (HPTLC) fingerprinting demonstrated multiple well-resolved peaks with R_f values ranging from 0.01 to 0.99, suggesting the presence of several bioactive compounds. The appearance of multiple peaks supports the chemical diversity and synergistic nature of the ingredients, which may contribute to the overall therapeutic efficacy of SV in managing hepatic disorders.

Fourier Transform Infrared (FTIR) spectral analysis revealed the presence of significant functional groups such as O–H stretching (3319.31cm^{-1}), C–H stretching ($\sim 3000\text{--}2850\text{cm}^{-1}$), C=C stretching (1598.58cm^{-1}), C–H bending (1424.16), =C–H bending (986.84), =C–H bending (910.45), C–X stretching (534.76). The spectrum indicates that the sample contains a mixture of hydroxyl-containing compounds, aromatic systems, aliphatic chains, and possibly halogenated or mineral components, which is consistent with complex polyherbal formulations.

Inductively Coupled Plasma–Optical Emission Spectrometry (ICP–OES) analysis confirmed the absence of toxic heavy metal contamination. Arsenic, cadmium, and mercury were below detectable levels (BDL), while the sample showed a lead level of 1.795mg/kg , which is well within the safe limit of 10mg/kg (10ppm) set by the Ayurvedic Pharmacopoeia of India (API)^[6]. These findings indicate that the formulation is safe for internal administration and complies with regulatory safety standards. Overall, the integrated analytical approach adopted in the present study successfully established reliable quality control parameters for *Seviya Vadagam*. The findings scientifically validate the formulation's authenticity, safety, and chemical consistency, thereby supporting its therapeutic application in hepatic disorders and promoting further pharmacological and clinical investigations.

CONCLUSION

The present study successfully established the standardization profile of *Seviya Vadagam* (SV) using advanced spectroscopic and chromatographic techniques. The combined results from TLC and HPTLC confirm the polyherbal composition and diverse phytoconstituents responsible for the formulation's therapeutic potential. FTIR analysis identified important functional groups associated with

biologically active compounds, while ICP–OES analysis confirmed that heavy metal levels were within permissible safety limits. Collectively, these findings demonstrate that *Seviya Vadagam* is a chemically complex, standardized, and toxicologically safe Siddha formulation. The study provides a scientific basis for its traditional use in liver-related disorders and supports future pharmacological and clinical research.

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REFERENCES

1. Sanmugampillai. Aathmarakshamirtham Vaiththiya Saara Sangiragam. Viththiya Rathnaagaram Noolagam Publication; 1930. p. 473.
2. Kannusamy Pillai C. Sigicha Rathna Dheepam Ennum Vaiththiya Nool. 1951.
3. Joseph J, Jeeva S. GC-MS and FT-IR analysis of the coastal medicinal plant *Hyptis suaveolens* (L.) Poit. Journal of Coastal Life Medicine. 2016; 4(5): 380–389.
4. Yang Y, Zhi Y, Zhao Z, Zhang J, Shi Y, Wang Y. Investigation of medicinal plants for hepatic diseases using HPTLC and FT-IR analysis. Molecules. 2020; 25: 1219.
5. AOAC International. Official Methods of Analysis. 22nd ed. Vol. 1. Chapter 9.2.39; 2023. p. 51–54.
6. Government of India, Ministry of AYUSH. The Ayurvedic Pharmacopoeia of India. Part I, Vol. IX. New Delhi: Pharmacopoeia Commission for Indian Medicine & Homoeopathy; 2016.

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