RESEARCH PAPER

Analytical Standardization of Striae Care by HPTLC: A Polyherbal Approach for Skin Health

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ABSTRACT

Background: Striae distensae (Kikkisa) is a common dermatological condition associated with dermal tearing, collagen degradation, and reduced skin elasticity. Ayurvedic poly herbal formulations are widely used for its management, however scientific standardization using modern analytical techniques is essential to ensure quality and efficacy. Objectives: To evaluate the phytochemical profile and establish the HPTLC fingerprint of Striae Care, a poly herbal dermatological formulation. Materials and Methods: The methanolic extract of Striae Care was prepared and analyzed using High-Performance Thin Layer Chromatography (HPTLC). Silica gel 60 F254 plates were used as the stationary phase, with Toluene: Ethyl acetate: Formic acid (2:3:0.5 v/v/v) as the mobile phase. Sample application was performed using a CAMAG Linomat 5 applicator. Plates were derivatized and scanned densitometrically at 254 nm and 366 nm. Rf values and peak areas were recorded. Results: HPTLC analysis revealed distinct bands indicating multiple phytoconstituents. At 254 nm, peaks corresponded to lipid fractions (60%), alkaloids and phenolics (25%), and flavonoids (15%). At 366 nm, a dominant peak (80%) suggested curcuminoids, along with flavonoids, terpenoids, and minor polar compounds. Conclusion: The study established a characteristic HPTLC fingerprint of Striae Care, supporting its standardization and potential efficacy in managing striae distensae.

Keywords: HPTLC, Polyherbal formulation, striae care..

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INTRODUCTION

Standardization of herbal formulations is vital to ensure consistency and therapeutic reliability. In Ayurvedic pharmaceutics, the integration of modern analytical methods such as High-Performance Thin Layer Chromatography (HPTLC) plays a significant role in validating traditional formulations[i]. HPTLC offers high sensitivity and precision for Phytoconstituent analysis of herbal drugs, making it ideal for developing fingerprint profiles.[ii] Striae care drugs are extensively mentioned *in Ayurvedic* classics *Astanga Samgraha* under *Kikkisa (*striae distensae) *Chikitsa* have gained increasing importance in dermatological practice due to their multi-targeted actions, safety, and minimal side effects.Various phytoconstituents such as flavonoids, phenolic compounds, terpenoids, alkaloids, and lipid fractions contribute significantly to skin health. Flavonoids and phenolic compounds show considerable activities like antioxidant and anti-inflammatory activities, so protecting the skin from oxidative stress and collagen degradation.[iii] Terpenoids facilitate wound healing and enhance transdermal drug delivery, while lipid fractions act as emollients, improving skin hydration and maintaining barrier function. Alkaloids also possess antimicrobial and anti-inflammatory properties, supporting dermal repair processes.[iv] The present study aims to evaluate the HPTLC fingerprint profile of *Striae Care* formulation and to identify the probable phytochemical classes responsible for its therapeutic efficacy in the management of striae distensae.

METERIAL AND METHODS

A test sample was prepared using 1g of *Striae Care* formulation, which was dissolved in 10 ml of methanol. Sonication of the solution was done for 15 min; later, it was

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cooled and filtered by filter paper. Filtrate obtained was taken for HPTLC analysis.

Stationary Phase: Silica gel 60 F254 precoated TLC plates (10 × 10 cm, 0.2mm) (MERCK)

Mobile Phase: Toluene: Ethyl acetate: Formic acid (2 :3: 0.5 v/v/v)

Sample Application: 10 µL as 6 mm bands on Silica gel plates using CAMAG Linomat 5 applicator
(S/N: 280008)

Chamber Saturation & Development: Chromatography process was done in a CAMAG twin
trough chamber pre-saturated with mobile phase vapour; development up to 8 cm was achieved.

Derivatization: Derivatization was done with the help of CAMAG dip tank for 1 minute

Drying: Pre Heated in TLC plate heater 100±5°C for 3 minutes

Detection: Densitometric scanning was done at 254 nm (UV) and 366 nm (fluorescence) using
CAMAG TLC Scanner 3 equipped with win CATS 4 software

Documentation: Calculation of Rf values, and recording under UV light for qualitative
identification of phytoconstituents. Calculation of Rf values and recording of bands under UV and visible light for qualitative Identification.

ETHICAL STATEMENT

The current study was confined to the analytical standardization of herbal formulation employing HPTLC. There were no experiments with people or animals, so there was no need for ethical approval.

STATISTICAL ANALYSIS

Win CATS software (CAMAG, Switzerland) was used to perform densitometric analysis of samples by determining Rf values and calculating peak areas of the resolved bands and percentage area (% area) of each band was subsequently used for the phytochemical evaluations. This study was descriptive and primarily concentrated on the qualitative and semi-quantitative HPTLC fingerprint profiles for the standardisation of the formulations.

INTERPRETATION

Analysis using HPTLC at 254 nm revealed distinct spots at Rf 0.70–0.72, 0.82–0.85, and 0.90–0.95,
indicating the presence of alkaloids, phenolic compounds, flavonoids, and non-polar lipid
constituents, as shown in Table 1.

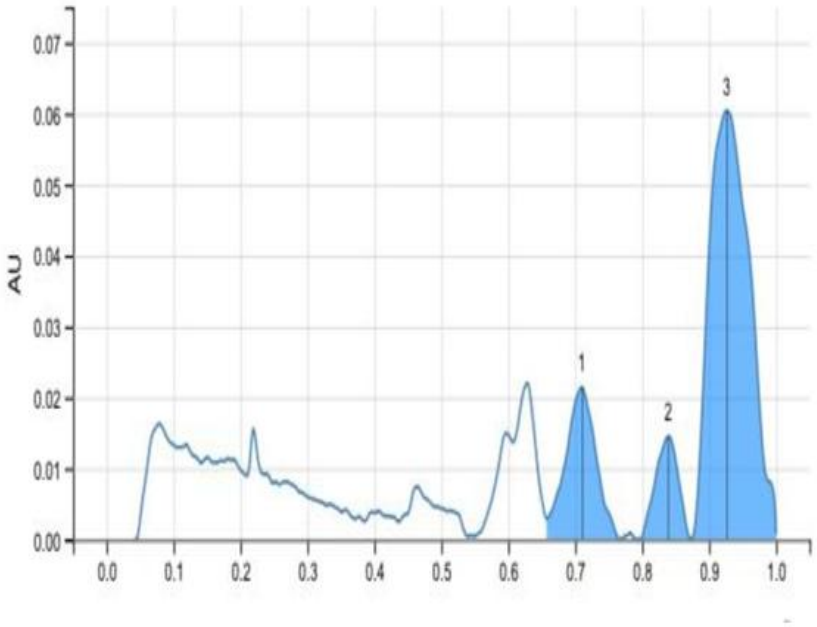

Figure:1
HPTLC Chromatogram at 254 nm

Figure:2
HPTLC plate visualization at 254nm

Table 1: Probable phytochemicals present in Striae Care under 254 nm visualisation;

Rf range	Probable phytochemical class	Likely ingredient source	UV 254 nm relevance	Probable pharmacological significance	Area % interpretation
0.70–0.72	Alkaloids, phenolic compounds	*Kutaja* (*Holarrhena pubescens*) *Haridra* (*Curcuma longa*)	Strong absorption at 254 nm due to conjugated systems	Anti-inflammatory, antimicrobial, supports dermal repair	Moderate (25%) significant secondary active constituent
0.82–0.85	Flavonoids, phenolics	*Musta* (*Cyperus rotundus*) *Tulsi* (*Ocimum sanctum*)	Moderate UV absorption	Antioxidant, improves complexion, reduces oxidative stress	Low–moderate (15%), supportive phytoconstituents
0.90–0.95	Non-polar compounds (terpenoids, lipid fractions)	*Tila taila* (*Sesame oil*) bees wax, volatile fractions of *Tulsi* (*Ocimum sanctum*) & *Musta* (*Cyperus rotundus*)	Strong absorption at higher Rf region	Emollient, enhances skin hydration, improves elasticity and barrier function	Highest (60%), dominant component indicating lipid-rich base

Similarly, analysis at 366 nm showed prominent spots at Rf 0.05–0.10, 0.55–0.60, 0.68–0.72, and 0.85–0.92, representing polar compounds, flavonoids, curcuminoids, and terpenoids, with curcuminoids exhibiting the highest intensity, as shown in Table 2.

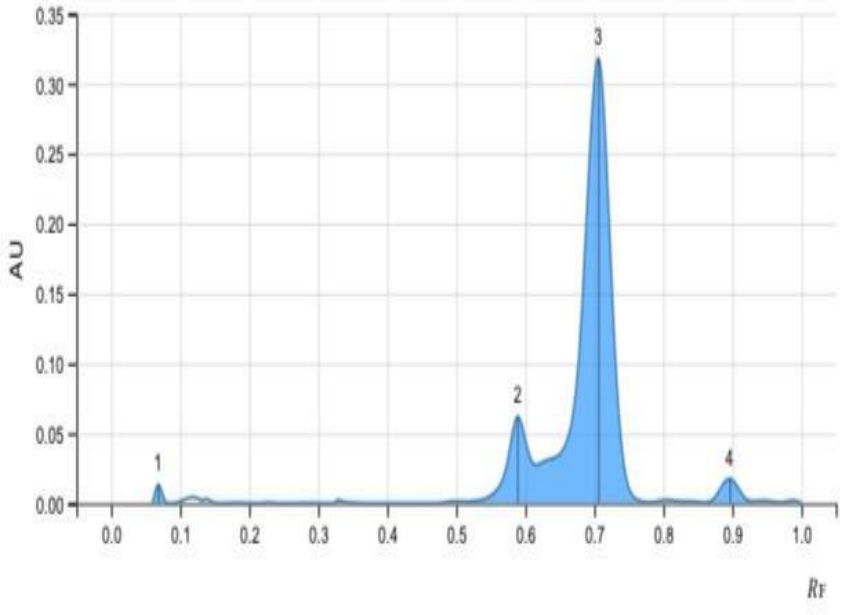

Figure:1
HPTLC Chromatogram at 366 nm

Figure:2
HPTLC plate visualization at 366nm

Table 2: Probable phytochemicals present in Striae Care under 366 nm visualisation

Rf range	Probable phytochemical class	Likely ingredient source(s)	Fluorescence behavior under 366 nm	Probable pharmacological role	Area % interpretation
0.05–0.10	Polar compounds (glycosides, tannins)	*Kutaja Twak* (*Holarrhena pubescens)* *Musta* (*Cyperus rotundus)*	Weak bluish/low fluorescence	Astringent, skin tightening, reduces dermal laxity	Very low (2%), trace constituents with supportive role
0.55–0.60	Flavonoids, phenolic compounds	*Musta* (*Cyperus rotundus)* *Tulsi* (*Ocimum sanctum)*	Greenish-yellow fluorescence	Antioxidant, improves skin tone, prevents oxidative damage	Moderate (10%), contributes to overall therapeutic activity
0.68–0.72	Curcuminoids (polyphenolic compounds)	*Haridra* (*Curcuma longa)*	Bright yellow/orange fluorescence (characteristic)	Anti-inflammatory, collagen modulation, enhances skin repair and elasticity	Highest (80%), dominant bioactive compound
0.85–0.92	Terpenoids, volatile oils	*Tulsi* (*Ocimum sanctum)* *Musta* (*Cyperus rotundus)*	Bluish-green fluorescence	Enhances transdermal penetration, antioxidant, mild anti-inflammatory	Low (8%), supportive phytoconstituents

RESULTS: The chromatographic analysis revealed multiple distinct bands under UV and visible light, confirming a complex mixture of phytoconstituents with different polarities as shown in table no:3.

Table 3: Rf values obtained for methanol extract of *Striae Care* Under 254 nm and 366 nm visualisation;

Spot No.	254 nm		366 nm	
	Rf value	Area%	Rf Value	Area%
1	0.71	25%	0.06	2%
2	0.83	15%	0.58	10%
3	0.92	60%	0.70	80%
4			0.89	8%

DISCUSSION

The development of striae is characterised by dermal tearing, reduced collagen content, elastin fibres fragmentation and alteration in extracellular matrix organisation. This occurs primarily because of mechanical stretching and hormonal influences.[v] The HPTLC analysis of Striae Care revealed a dominant fluorescent peak at Rf 0.70 at 366 nm, which might correspond to curcuminoids from *Curcuma longa* (80%). Curcumin reduces collagen degradation by enhancing fibroblast proliferation and collagen synthesis (Type I and III) while inhibiting matrix metalloproteinases (MMPs).[vi] This phytochemical from

Haridra also helps in ECM remodelling and dermal repair by modulating the transformation of growth factor-beta (TGF-β) Siganling.[vii] The moderate peaks observed in the Rf range of 0.55–0.60 (366 nm) and 0.83 (254 nm) indicate the presence of flavonoids and phenolic compounds from *Musta (Cyperus rotundus)* and *Tulasi (Ocimum sanctum)*. These compounds having strong antioxidant activity, neutralizing reactive oxygen species (ROS) that contribute to collagen breakdown and elastin fibers damage. Flavonoids also improve microcirculation and facilitate dermal regeneration.[viii] Minor peaks at higher Rf values (0.85–0.92) might be associated with the presence of terpenoids and volatile constituents, which act as natural penetration enhancers. These compounds disrupt the stratum corneum lipid matrix, thereby facilitating deeper delivery of active constituents into the dermis, where striae pathology primarily resides. At 254 nm, the dominant peak at Rf 0.92 represents the lipid-rich base *(Tila Taila* and beeswax), which plays a significant role in restoring skin hydration and elasticity. Sesame oil is rich in essential fatty acids and antioxidants that enhance skin barrier function and reduce trans epidermal water loss, thereby maintaining dermal flexibility and preventing further collagen damage.[ix]Additionally, the presence of low Rf polar compounds derived from *Kutaja* (*Holarrhena pubescens)* indicates tannin and astringent activity, contributing to skin tightening and stabilization of dermal proteins, which may reduce the width and prominence of striae.

CONCLUSION

The research created a unique HPTLC fingerprint profile for Striae Care, showing that it contains important bioactive phytoconstituents like curcuminoids, flavonoids, and lipid fractions. These results support its standardization of quality and show that it would help improve skin elasticity and treat striae distensae**.**

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ABBREVIATIONS

AU: Absorbance Units
CAMAG: Chemical Analysis Methods and Apparatus for Gases
ECM: Extracellular Matrix
HPTLC: High-Performance Thin Layer Chromatography
MMPs: Matrix Metalloproteinases
Rf: Retention factor
ROS: Reactive Oxygen Species
S/N: Serial Number
TGF-β: Transforming growth factor-beta
TLC: Thin Layer Chromatography
UV: Ultraviolet
v/v/v: Volume / Volume / Volume

CONFLICT OF INTEREST: NO
FINANCIAL SUPPORT AND SPONSORSHIP: NO

SUMMARY

Chromatography (HPTLC) fingerprinting method. The methanol extract of Striae Care was analysed at 254 and 366 nm wavelength and showed different phytochemicals developing distinct HPTLC fingerprints. The observed major peaks at 254 nm were found to be associated with lipid fractions (60%), with some alkaloids, phenolics and flavonoids. The phytochemicals that developed the highest levels of peaks at 366 nm were curcuminoids (80%), followed by flavonoids, terpenoids and minor polarity compounds. The identification of these plant-related bioactive components in Striae Care may contribute to the products potential usefulness in helping the skin to become more elastic when hydrated and promoting dermal repair from dryness. Furthermore, the HPTLC fingerprinting of Striae Care provides a reliable means for the quality control and standardisation of the formulation..

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