

Standardization and Analytical Evaluation of Sahachar Taila: A Physicochemical and HPTLC Fingerprinting Study

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Abstract

Sahachar Taila is a classical single-herb Ayurvedic formulation widely indicated in *Vata Vyadhi* disorders. Despite its extensive therapeutic use, scientific data regarding its standardization and analytical profiling remain limited. The present study aims to evaluate the physicochemical characteristics and develop an HPTLC fingerprint of *Sahachar Taila* prepared according to traditional *Sneha Paka* methodology.

Sahachar Taila was prepared using *Tila Taila* as the lipid base in the classical proportion of 1:4:16 for *Kalka*, *Sneha*, and *Kwatha*, respectively. The *Kalka* and *Kwatha* were prepared from authenticated roots of *Sahachar* (*Barleria prionitis* Linn.). The mixture was subjected to mild heating and continuous stirring for five days until characteristic *Taila Siddhi Laksanas* were achieved. The finished product was filtered, stored in airtight containers, and evaluated for physicochemical

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parameters including specific gravity, refractive index, acid value, saponification value, iodine value, and peroxide value. HPTLC fingerprinting was performed to identify marker constituents and ensure batch-to-batch quality consistency.

The prepared Sahachar Taila showed physicochemical values within acceptable ranges for Ayurvedic medicated oils, indicating good stability and quality. HPTLC analysis produced a distinct chromatographic pattern with multiple resolved peaks. The study establishes baseline physicochemical standards and a reproducible HPTLC fingerprint for Sahachar Taila and hence contributing to its quality assurance, standardization, and scientific validation.

Key words : *Sneha Paka; Vata Vyadhi, Tailasiddhi lakshanas, Kalka, Kwatha.*

S*ahachar Taila* is a classical Ayurvedic oil formulation widely indicated in *Vata Vyadhi* (neuromuscular and locomotor disorders) due to its *Vatahara* (Vata-pacifying) and *Sulaprasamana* (analgesic) properties¹. It is traditionally prepared as a single-drug *Sneha* using the roots of *Sahachar* (*Barleria prionitis* Linn.), a medicinal plant known for its anti-inflammatory, antispasmodic and muscle-relaxant activities reported in traditional Ayurvedic literature as well as modern phytochemical studies^{2,3}. Ayurvedic classics emphasize the need for proper *Sneha Paka* (medicated oil preparation) and achieving *Taila Siddhi Lakshanas* to ensure therapeutic efficacy of medicated oils⁴.

Standardization of Ayurvedic formulations has become essential to establish identity, purity and consistency, especially for herbal oils where variability in raw materials, extraction procedures and heating duration may influence the final product quality⁵. Physicochemical parameters such as acid value, saponification value, iodine value, peroxide value, specific

gravity and refractive index are widely used to evaluate oil stability, purity and degradation characteristics⁶. High-Performance Thin Layer Chromatography (HPTLC) serves as an important analytical tool for generating characteristic chemical fingerprints, ensuring batch-to-batch uniformity and detecting adulteration in herbal formulations⁷.

Although Sahachar Taila is frequently prescribed in Ayurvedic clinical practice, limited scientific data exists regarding its physicochemical profile and chromatographic standardization. Hence, the present study aims to evaluate the physicochemical characteristics and establish an HPTLC fingerprint of Sahachar Taila prepared according to classical guidelines. This analytical documentation may aid in developing quality control standards and ensuring reproducibility of the formulation for therapeutic use.

Aims and Objectives :

1. To prepare *Sahachar Taila* using classical *Sneha Paka* methodology.

2. To evaluate the physicochemical parameters of the prepared *Sahachar Taila*.
3. To develop an HPTLC fingerprint profile for standardization and quality assurance.

- Iodine value
- Peroxide value

All tests were conducted as per pharmacopeial methods.

Materials :

- **Raw drug:** Roots of *Sahachar* (*Barleria prionitis* Linn.), authenticated as per Ayurvedic pharmacopeial standards.
- **Base oil:** *Tila Taila* (sesame oil), pharmacopeial grade.
- **Proportions:** *Kalka*, *Sneha*, *Kwatha* in the ratio 1:4:16 as described in classical *Sneha Paka* guidelines.
- **Chemicals & solvents:** Analytical grade reagents for physicochemical tests and HPTLC analysis.

HPTLC Analysis :

HPTLC fingerprinting was performed to establish a chromatographic profile of *Sahachar Taila*.

- **Stationary phase:** Pre-coated silica gel 60 F254 plates
- **Mobile phase:** Optimized solvent system suitable for oil-based herbal extracts
- **Detection:** UV visualization at 254 nm and 366 nm, followed by derivatization (if required)
- **Outcome:** Distinct band patterns indicating marker constituents and ensuring quality consistency.

Preparation of Sahachar Taila :

The roots of *Sahachar* were cleaned, dried and powdered to prepare *Kalka*. *Kwatha* was prepared using the same roots following the classical decoction method. *Kalka*, *Sneha* (sesame oil), and *Kwatha* were combined in the prescribed ratio and heated gently over a mild flame with continuous stirring for five days until attainment of characteristic *Taila Siddhi Laksanas* (completion indicators). The final oil was filtered and stored in airtight containers.

Observation and findings :

Organoleptic Observations :

The prepared *Sahachar Taila* exhibited typical sensory characteristics of a medicated oil. The color was yellowish green, and the oil possessed a characteristic odor suggestive of the *Sahachar* (*Barleria prionitis*) root. The consistency was liquid at room temperature, and the taste was oily, which is consistent with classical descriptions of *Sneha Kalpana*.

Physicochemical Analysis :

The prepared oil was analyzed using standard Ayurvedic and modern analytical procedures for the following parameters:

- Specific gravity
- Refractive index
- Acid value
- Saponification value

Table-1. Organoleptic Characteristics of *Sahachar Taila*

| Parameter | Observation |
|-------------|-----------------|
| Color | Yellowish green |
| Odor | Characteristic |
| Taste | Oily |
| Consistency | Liquid |

Physicochemical Observations :

The physicochemical parameters were evaluated to assess the quality, stability, and authenticity of *Sahachar Taila*. The results are presented below.

Table-2. Physicochemical Parameters

| Parameter | Result |
|----------------------|------------|
| Loss on Drying (%) | 0.50 |
| Refractive Index | 1.4540 |
| Specific Gravity | 0.9036 |
| Rancidity Test | Not Rancid |
| Viscosity | 23.03 |
| pH | 4.7 |
| Acid Value | 5.04 |
| Iodine Value | 110 |
| Saponification Value | 225 |

Interpretation :

- The **low Loss on Drying** indicates minimal moisture and good shelf stability.
- The **refractive index** and **specific gravity** fall within expected ranges for sesame-based medicated oils.
- The **acid value (5.04)** reflects minimal free fatty acids, demonstrating acceptable purity.
- A **high iodine value (110)** suggests the presence of unsaturated fatty acids typical of *Tila Taila*.
- The **saponification value (225)** indicates normal triglyceride composition of the oil.
- The product **did not show rancidity**, indicating no oxidative degradation.

Solubility Observations :

Table-3. Solubility Profile

| Solvent | Result |
|---------------|--------|
| Chloroform | ++ |
| Diethyl Ether | ++ |
| Alcohol | + |
| Water | - |

Interpretation :

The oil showed strong solubility in non-polar organic solvents (chloroform and ether), mild solubility in alcohol, and complete insolubility in water. This behavior confirms its lipid-rich nature.

*HPTLC Observations :**Chromatographic Profile at 254 nm :*

Five distinct spots were observed under UV 254 nm, indicating multiple phytochemical constituents absorbed from *Sahachar* root into the oil.

Table-4. RF Values @ 254 nm

| Spot No. | RF Value |
|----------|----------|
| 1 | 0.022 |
| 2 | 0.690 |
| 3 | 0.803 |
| 4 | 0.868 |
| 5 | 0.957 |

Chromatographic Profile at 366 nm :

Four fluorescent spots were detected under UV 366 nm, suggesting the presence of flavonoids, coumarins, or other chromophoric molecules.

Table-5. RF Values @ 366 nm

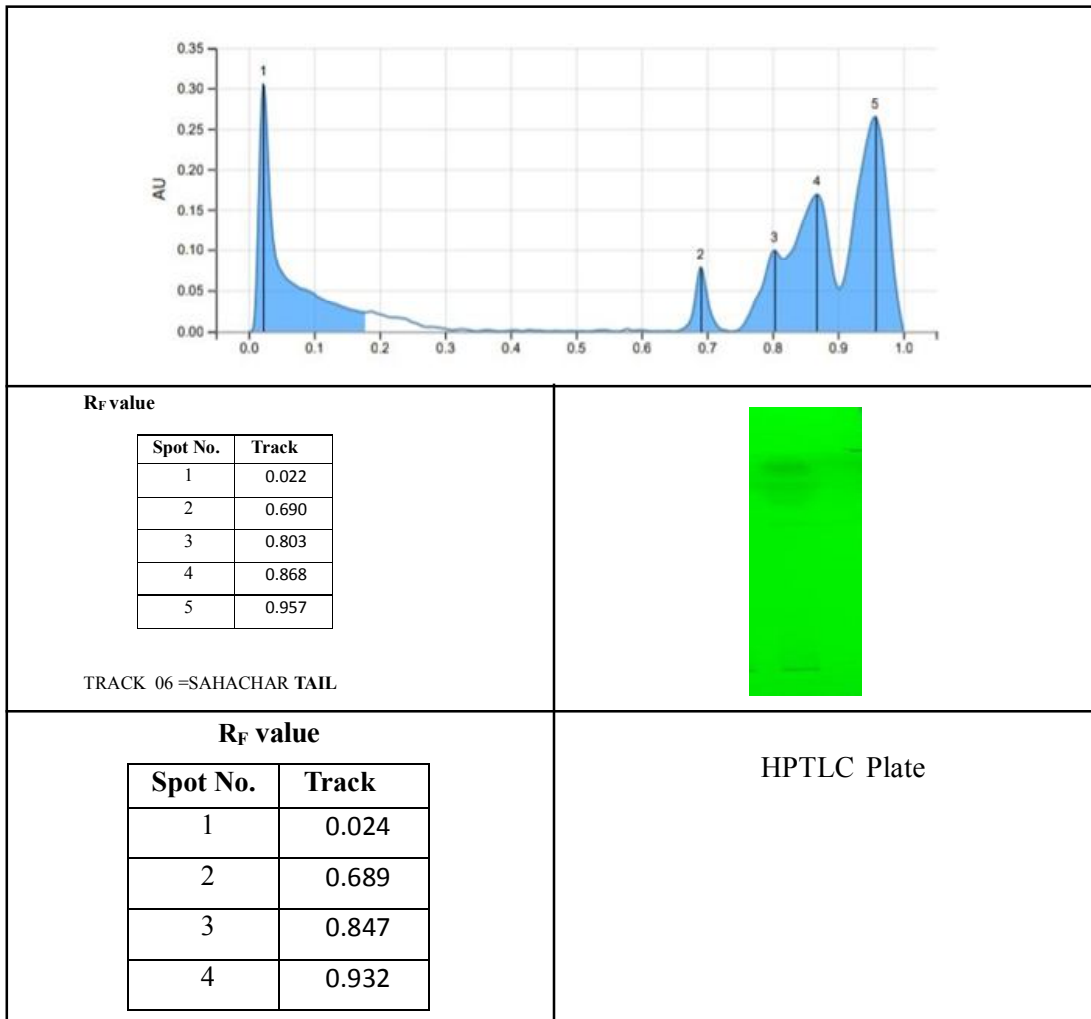
| Spot No. | RF Value |
|----------|----------|
| 1 | 0.024 |
| 2 | 0.689 |
| 3 | 0.847 |
| 4 | 0.932 |

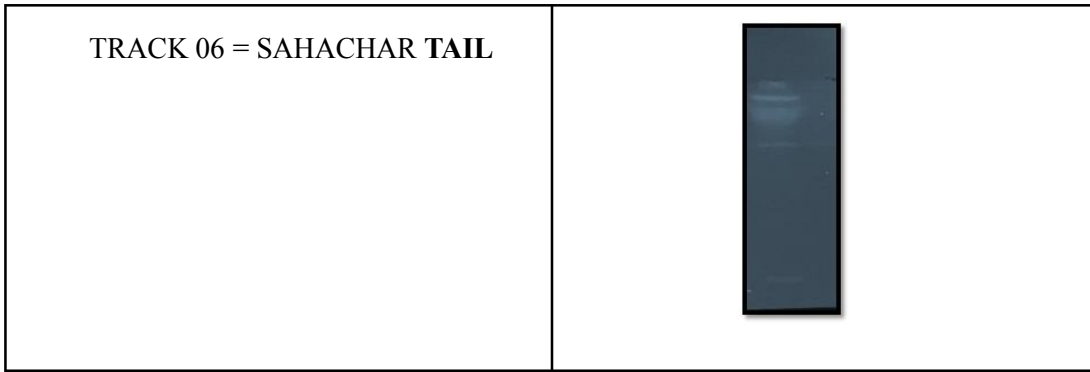
Interpretation :

- The high-intensity bands at higher RF

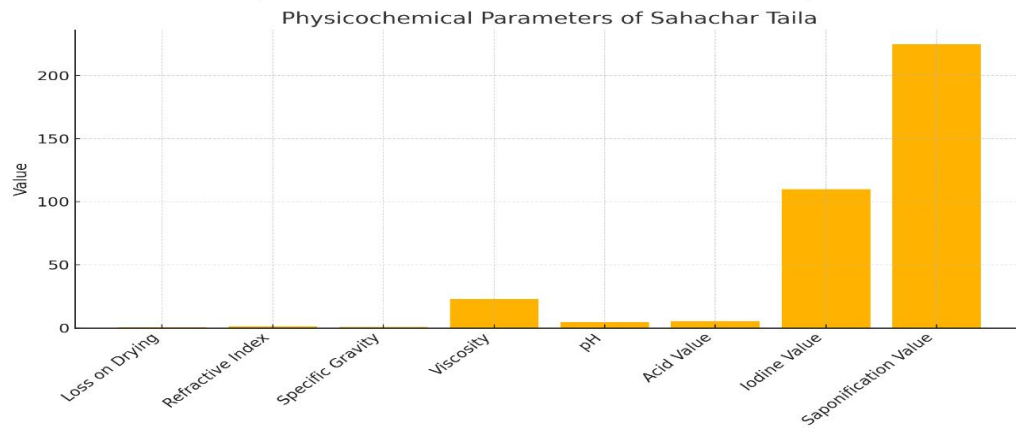
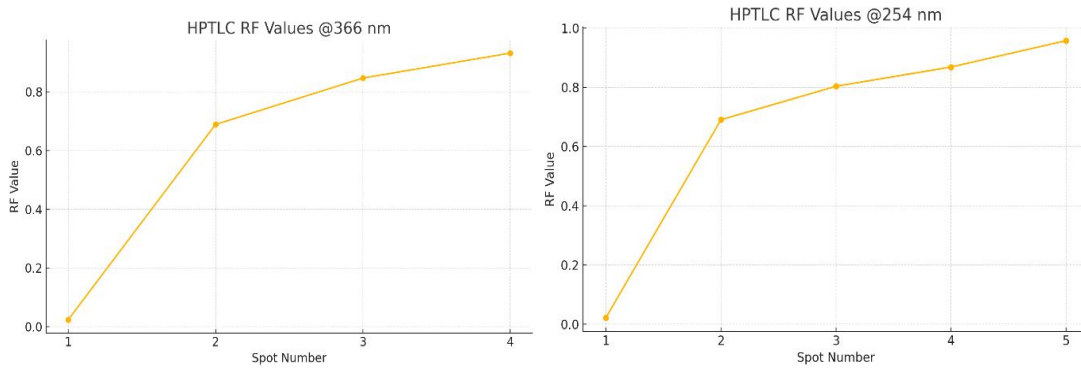
values reflect the presence of non-polar phytoconstituents that migrate strongly with the mobile phase.

- Reproducible RF spots confirm the **consistency of the extraction** and **authenticity of the formulation**.
- The combined 254 nm and 366 nm fingerprints serve as a **reference profile** for future standardization and quality control of *Sahachar Taila*.





- *Sahachar Taila* displayed organoleptic features consistent with classical standards.
- Physicochemical parameters were within acceptable ranges, indicating good quality and stability.
- HPTLC analysis revealed distinct and reproducible chromatographic peaks, establishing a **characteristic fingerprint** for the formulation.
- The combined analytical results validate the **authenticity, purity, and standardization** of the prepared *Sahachar Taila*.



The present analytical study was carried out to evaluate the quality, purity, and standardization profile of *Sahachar Taila*, a classical Ayurvedic medicated oil indicated predominantly in *Vāta Vyadhi* conditions. The results obtained through organoleptic assessment, physicochemical analysis, and HPTLC fingerprinting provide comprehensive insights into the formulation's characteristics, stability, and phytochemical constituents.

Organoleptic Characteristics :

The yellowish-green color, characteristic odor, oily taste, and liquid consistency observed in the sample align with the typical properties of medicated oils prepared using *Tila Taila* as the base. The characteristic odor and color reflect the successful incorporation of lipophilic phytoconstituents from *Sahachar (Barleria prionitis Linn.)* root during the *Sneha Pāka* process. These observations support the classical concept of *Sneha GrahaGa*—the absorption of active constituents into the oil medium during prolonged heating.

Physicochemical Parameters :

Physicochemical parameters serve as essential indicators of purity, stability, and authenticity of Ayurvedic oil formulations.

- **Loss on Drying (0.50%)** indicates minimal moisture content, reducing the risk of microbial growth and ensuring longer shelf-life.
- **Refractive index (1.4540)** and **specific gravity (0.9036)** fall within expected ranges for sesame oil-based formulations, confirming the integrity of the base oil.
- **Acid value (5.04)** was within permissible

limits, demonstrating low free fatty acid content and indicating minimal degradation.

- The **iodine value (110)** suggests the presence of unsaturated fatty acids, which is characteristic of *Tila Taila* and contributes to its permeation-enhancing properties.
- The **saponification value (225)** reflects the presence of a normal proportion of medium-chain triglycerides, supporting proper lipid composition.
- The sample showed **no rancidity**, confirming the absence of oxidative degradation and assuring good stability.

Collectively, these physicochemical findings affirm that the formulation was prepared correctly and maintained in optimal condition.

HPTLC Fingerprinting :

HPTLC analysis revealed well-defined chromatographic profiles at both 254 nm and 366 nm, demonstrating the presence of multiple phytoconstituents extracted during oil-processing.

At 254 nm :

Five distinct spots (RF 0.022 to 0.957) were observed. The wide range of RF values indicates the presence of both polar and non-polar compounds, consistent with the diverse chemical nature of phytoconstituents in *Barleria prionitis*.

At 366 nm :

Four fluorescent bands were detected (RF 0.024 to 0.932), highlighting the presence of coumarins, flavonoids, and other UV-

fluorescent compounds reported in the plant. These compounds are known for anti-inflammatory, antioxidant, and analgesic effects, correlating with the therapeutic indications of *Sahachar Taila*.

Significance of HPTLC Findings :

- Distinct and reproducible bands confirm successful extraction of active constituents.
- The fingerprint can serve as a **standard reference profile** for future quality control.
- Presence of multiple phytochemical bands supports the **complex therapeutic potential** of the formulation.

Correlation with Therapeutic Action :

Barleria prionitis is known for its anti-inflammatory, antispasmodic, and analgesic properties, which aligns with *Sahachar Taila*'s classical indication in *Vata Vyadhi*—a group of neuro-musculoskeletal disorders characterized by pain, stiffness, and restricted movement.

The presence of unsaturated fatty acids (indicated by iodine value), combined with the detected phytochemicals, enhances the oil's ability to penetrate tissues (*Sukma Guna*), enabling deeper therapeutic action.

Comparison with Classical Standards :

The formulation adhered well to the classical descriptions of *Taila Siddhi Lakcaas* and achieved desired physicochemical stability. The HPTLC fingerprint further validates its authenticity, aligning with modern expectations of herbal standardization.

Overall Interpretation :

The comprehensive analysis indicates

that the prepared *Sahachar Taila* is:

- **Authentic**, based on organoleptic and classical characteristics
- **Stable**, supported by physicochemical parameters
- **Phytochemically rich**, confirmed by HPTLC fingerprinting
- **Standardizable**, with reproducible chromatographic patterns

These findings collectively support the therapeutic reliability of *Sahachar Taila* and contribute valuable data for the standardization of Ayurvedic oil formulations.

The present analytical study successfully established the organoleptic, physicochemical, and chromatographic profile of *Sahachar Taila* prepared as per classical *Sneha Paka* methodology. The physicochemical parameters—including refractive index, specific gravity, acid value, iodine value, saponification value, and absence of rancidity—were found to be within acceptable limits, indicating good quality, purity, and stability of the formulation.

HPTLC fingerprinting revealed distinct and reproducible bands at both 254 nm and 366 nm, confirming the presence of multiple phytoconstituents derived from *Sahachar (Barleria prionitis* Linn.). This chromatographic profile can serve as a standard reference for future quality control and authentication of *Sahachar Taila*.

Overall, the study provides a validated analytical framework for the standardization of *Sahachar Taila*, supporting its therapeutic reliability in *Vata Vyadhi* and contributing to improved quality assurance of classical Ayurvedic medicated oils. Further pharmacological and

clinical studies may help correlate these analytical findings with therapeutic efficacy.

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