

## PHYSICOCHEMICAL EVALUATION AND HPTLC FINGERPRINTING OF VIPAREETA MALLA TAILA AND ITS OINTMENT FORMULATION

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### ABSTRACT

**Background:** *Vipareeta Malla Taila*, a classical *Ayurvedic* oil-based formulation described in *Chakradatta* under *Vrana Shotha Adhikara*, is traditionally indicated for the management of *Vrana*. Modification of traditional dosage forms into patient-friendly formulations, such as ointments, may enhance therapeutic applicability, ease of administration, and patient compliance while preserving the inherent therapeutic potential of the formulation. **Aim:** To prepare *Vipareeta Malla Taila*, develop an ointment from the classical formulation, and evaluate its physicochemical, microbiological, and HPTLC characteristics. **Methods:** *Vipareeta Malla Taila* was prepared according to the classical *taila paka* procedure. The medicated oil was converted into an ointment using a suitable ointment base. Both the oil and ointment were subjected to physicochemical evaluation, microbiological analysis, and

HPTLC fingerprint profiling using standard analytical procedures. **Results:** The prepared *Vipareeta Malla Taila* showed a pH of 4.2, specific gravity of 0.94, refractive index of 1.462, iodine value of 103.68, acid value of 3.10, peroxide value of 63.18, and saponification value of 184.90. The developed ointment exhibited a pH of 4.9, spreadability of 30 g cm/s, viscosity of 3629 cP, total fat content of 80.72% w/w, and total acidity of 0.82%. Microbial analysis showed counts within permissible limits, with the absence of specified pathogenic organisms. HPTLC analysis revealed a characteristic fingerprint profile at 254 nm and 366

nm, which may serve as a reference marker for quality control. **Conclusion:** The study established preliminary pharmaceutical and analytical standards for *Vipareeta Malla Taila* and its ointment form. The findings provide valuable reference data for quality assessment, standardization, and maintaining batch-to-batch consistency of the formulation.

**KEY WORDS:** *Vipareeta Malla Taila*, Ointment, Physicochemical evaluation, HPTLC, *Chakradatta*, *Vrana Shotha*.

## INTRODUCTION

*Ayurveda*, the traditional system of Indian medicine, has gained global recognition owing to its holistic approach and extensive use of natural therapeutic agents. *Rasashastra* and *Bhaishajya Kalpana* constitute the pharmaceutical branches of *Ayurveda* that deal with the preparation, standardization, and dispensing of herbal, herbo-mineral, and mineral formulations. Among the various dosage forms described in *Ayurvedic* pharmaceuticals, *sneha kalpana* represents an important category wherein medicinal substances are processed with lipid media such as *taila* or *ghrita* to enhance therapeutic efficacy and facilitate topical or internal administration.

*Vipareeta Malla Taila* is a classical herbo-mineral formulation described under *Vrana Shotha Adhikara* of *Chakradatta*<sup>[1]</sup> and is also referenced in other *Ayurvedic* texts. The formulation comprises eight ingredients and is traditionally indicated in the management of *Dushta Vrana*, *Nadivrana*, *Abhighataja Vrana*, *Upadamsha*, *Kushta*, *Vicharchika*, *Pama*, and *Galaganda*.<sup>[1]</sup> Owing to its diverse therapeutic applications, it remains a valuable formulation in *Ayurvedic* clinical practice.

Despite their therapeutic benefits, oil-based preparations have practical limitations such as greasiness, spillage, staining of clothes, and handling difficulties, which may affect patient acceptability and compliance. Conversion of traditional formulations into patient-friendly dosage forms like ointments may improve ease of application, convenience, portability, and handling.

Considering the limitations associated with oil-based formulations and the growing demand for patient-friendly topical dosage forms, the present study was undertaken to modify *Vipareeta Malla Taila* into an ointment formulation and evaluate its pharmaceutico-analytical characteristics.

## AIM AND OBJECTIVES

1. To prepare *Vipareeta Malla Taila* as per classical references and modify it into an ointment dosage form.
2. To carry out physicochemical, microbiological and chromatographic (HPTLC) analysis of *Vipareeta Malla Taila* and the developed ointment formulation.

## MATERIALS AND METHODS

The study was carried out in two phases

1. Pharmaceutical Study
2. Analytical Study

### 1. PHARMACEUTICAL STUDY

#### ➤ Collection and Authentication of Raw Materials

- The raw drugs *hing*, *vatsanabha*, *kushta*, *rasana*, *chitraka*, *sharapunkha*, *langali*, *tila taila* and beeswax were purchased from authentic sources.
- Macroscopic and microscopic identification of herbal raw drugs was done.
- Analysis of *tila taila* and beeswax was done in Department of QA and QC laboratory, Arya Vaidya Sala, Kottakkal.
- *Giri sindoor* was purchased from Ganeshyam, Industrial Estate, Veera Desai Road, Maharashtra and its identification was done at Department of *Rasa Shastra* and *Bhaishajya Kalpana*, Government Ayurveda College, Kannur.
- *Vipareeta Malla Taila* and its Ointment form was prepared in the Department of *Rasa Shastra* and *Bhaishajya Kalpana*, Government Ayurveda College Kannur.

#### ➤ Ingredients of *Vipareeta Malla Taila*



Fig.1: Giri Sindoor.



Fig. 2: Hingu.



Fig. 3: Vatsanabha.



Fig. 4: Kushta.



Fig. 5: Rasona.



Fig. 6: Chitraka.



Fig. 7: Sharapunkha.



Fig. 8: Langali.



Fig. 9: Tila Taila

Table No 1: Ingredients of *Vipareeta Malla Taila*.

| Sl. No | COMPONENTS OF SNEHA | INGREDIENTS          | SCIENTIFIC NAME           | QUANTITY                                                              |
|--------|---------------------|----------------------|---------------------------|-----------------------------------------------------------------------|
| 1.     | <i>Kalka Dravya</i> | <i>Giri sindoora</i> | Red Oxide of Mercury      | 1/4part (Total 225g)<br>Each 25g, except<br>Fresh Rasona taken<br>50g |
|        |                     | <i>Hingu</i>         | <i>Ferula foetida</i>     |                                                                       |
|        |                     | <i>Vatsanabha</i>    | <i>Aconitum napellus</i>  |                                                                       |
|        |                     | <i>Rasona</i>        | <i>Allium sativum</i>     |                                                                       |
|        |                     | <i>Kushta</i>        | <i>Saussurea lappa</i>    |                                                                       |
|        |                     | <i>Chitraka</i>      | <i>Plumbago zeylanica</i> |                                                                       |
|        |                     | <i>Sharapunkha</i>   | <i>Tephrosia purpurea</i> |                                                                       |
|        |                     | <i>Langali</i>       | <i>Gloriosa superba</i>   |                                                                       |
| 2.     | <i>Sneha Dravya</i> | <i>Tila Tila</i>     | <i>Sesamum indicum</i>    | 1Part(900ml)                                                          |
| 3.     | <i>Drava Dravya</i> | <i>Water</i>         | -                         | 4part(3600ml)                                                         |

#### ➤ Preparation of *Vipareeta Malla Taila*

Equipments Used: Mixer grinder, Sieve No:85, Weighing Balance, Grinding Stone, Widemouthed bronze vessel, Ladle, Glass Bottle.

#### ➤ Procedure

The preparation of *Vipareeta Malla Taila* can be divided into three stages:

- i. Processing of Raw Materials
- ii. Preparation of *Kalka*
- iii. Processing of *Vipareeta Malla Taila*

### i. Processing of Raw Materials

**Table No. 2: Processing of Raw Materials.**

| <i>Shodhana</i>    | <i>Drug</i>         | <i>Shodhana Method</i>                                                        | <i>Reference</i>                        |
|--------------------|---------------------|-------------------------------------------------------------------------------|-----------------------------------------|
| Mineral Ingredient | <i>GiriSindoora</i> | three <i>bhavanas</i> each with <i>Nimbu Swarasa</i> and <i>Tandulodaka</i> . | <i>Yoga Ratnakara</i> <sup>[2]</sup>    |
| Herbal Ingredients | <i>Hingu</i>        | <i>Gritha Bharjana</i>                                                        | <i>Rasa Tarangini</i> <sup>[3]</sup>    |
|                    | <i>Vatsanabha</i>   | <i>Atapa Gomutra Sthapana</i> for 3 days                                      | <i>Rasa Tarangini</i> <sup>[4]</sup>    |
|                    | <i>Chitraka</i>     | Soaking in <i>Churnodaka</i>                                                  | <i>Rasa Tarangini</i> <sup>[5]</sup>    |
|                    | <i>Langali</i>      | <i>Atapa Sthapana</i> in <i>gomutra</i> for 1 day                             | <i>Ayurveda Prakasha</i> <sup>[6]</sup> |



Fig.10 *Bhavana* of *giri sindoora* in *nimbu swarasa*



Fig.11: *Bhavana* of *giri sindoora* in *Tandulodaka*



Fig 12. *Gritha Barjana* of *hingu*



Fig.13 *Atapa Gomutra Stapana* for *Vastanabha*



Fig.14 *Chitraka Shodhana* in *Churnodaka*



Fig.15 *Atapa Gomutra Stapana* for *Langali*

### ii. Preparation of *Kalka*

After completing all the pre-pharmaceutical procedures, all the herbal ingredients except *rasona* were powdered using a mixer grinder. The powdered materials were then passed through sieve no. 85 to obtain a fine and uniform powder.

After sieving, each powdered ingredient was stored separately in clean, dry, labelled airtight zip-lock covers. The *shodhita giri sindoora* was stored separately in a clean, dry airtight glass container until further use.

All the powdered and sieved herbal ingredients—*hingu*, *vatsanabha*, *kushta*, *chitraka*, *sharapunkha*, and *langali*—were weighed 25 g each ( $25 \times 6 = 150$  g). *Rasona* being a fresh drug, was taken in double quantity (50 g). The mineral drug *shodhita giri sindoora* (25 g) was weighed separately and kept aside. Thus, the total quantity of *kalka* used for the preparation was 225 g.



**Fig. 16: Kalka.**

All the seven herbal ingredients were taken together and ground into a fine paste using a well-cleaned and dried grinding stone, with the addition of a sufficient quantity of water.

### **iii. Processing of Vipareeta Malla Taila**

For the preparation of *taila*, a good-quality wide-mouthed bronze vessel, a stainless-steel ladle, and a spatula were used. The vessels were washed well with hot water and dried properly.

The purchased *tila taila* was measured using a measuring cylinder. 900 ml of *taila* was taken in a bronze vessel and heated. Then, the prepared *kalka* was added, followed by the addition of water in a quantity sixteen times that of the *kalka*. The proportion maintained was *Kalka: Sneha: Jala* = 225 g: 900 ml: 3600 ml. The mixture was cooked at a mild to moderate temperature with continuous stirring, and the proper *lakshanas* were observed at each stage of the process. Heating was stopped once *khara paka* was attained. Immediately after attaining this stage, the *taila* was filtered through a clean, dried cotton cloth into a beaker kept ready.

Using the *patra paka* method at a controlled temperature, 25 g of accurately weighed *shodhita giri sindoora* was added to the prepared *taila* and mixed thoroughly to obtain a

homogeneous mixture. The resulting *taila* was then measured and stored in a clean, dry, airtight container.

➤ **Precaution**

1. The heat should be maintained at *Mandagni* throughout the process.
2. The *paka* stage should be carefully observed at every stage to avoid charring of the *kalka*.
3. Continuous stirring should be done to prevent the *kalka* from sticking to the vessel.



Fig.17 Preparation of  
*Vipareeta Malla Taila*



Fig.18 *Vipareeta Malla Taila*

➤ **Preparation of Vipareeta Malla Taila Ointment**

**Reference:** A single sample of *Vipareeta Malla Taila* Ointment was prepared based on the reference of *siktha taila* preparation mentioned in *Rasa Tarangini*.<sup>[7]</sup>

**Equipments Used**

Weighing Balance, Stainless Steel mug and cup, Knife, Glass bottle

The preparation was carried out in the following steps:

- i. Purification of beeswax
- ii. Processing of *Vipareeta Malla Taila* Ointment.

**Purification of Beeswax:** To remove impurities, the collected beeswax was first scraped into thin pieces using a clean knife. Water was taken in a small stainless-steel vessel and heated to perform the double boiler method. The sliced beeswax was gradually added to the mug placed over boiling water and heated until it melted completely

Once fully melted, the liquid beeswax was filtered through a clean, dry cotton cloth into another stainless-steel cup to separate the impurities. The purified beeswax was collected in the vessel and allowed to cool undisturbed.



Fig.19 Purification of bees wax by double boiling



Fig. 20 Purified bees wax

#### ➤ Processing of *Vipareeta Malla Taila* Ointment

For the preparation of the ointment, beeswax and the prepared *taila* were used in the ratio of 1:6. Accordingly, 18 g of purified beeswax was weighed and cut into thin pieces. 108 g of *Vipareeta Malla Taila* was measured using a clean borosil beaker and an electronic weighing balance.

The measured *taila* was then taken in a 250 ml stainless-steel mug and heated using the double boiler method by placing the mug over boiling water. The sliced beeswax was gradually added to the heated *taila*, allowing it to melt completely.

After the beeswax had completely melted and mixed with the *taila*, the molten mixture was transferred into a pre-weighed glass container, and the weight of the prepared ointment was recorded. The container was then kept undisturbed until the ointment cooled and solidified.

After cooling, it was properly closed with a lid and kept for storage.



Fig.21 Preparation of Ointment



Fig.22 *Vipareeta Malla Taila* Ointment

## 2. ANALYTICAL STUDY

Analytical Study was carried according to Ayurvedic Pharmacopoeia of India.

**Table No. 3: Analysis of Raw Materials.**

| Analysis of raw materials | Parameters                           |
|---------------------------|--------------------------------------|
| a. TILA TAILA             | Refractive index<br>Specific Gravity |
| b. BEES WAX               | Acid Value<br>Melting Point          |

**Table No. 4: Analytical Parameters of *Vipareeta Malla Taila* and Ointment.**

| <i>Vipareeta Malla Taila</i>                                                                                              | <i>Vipareeta Malla Taila</i> Ointment                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Organoleptic Characters                                                                                                   | Organoleptic Characters                                                                                                                    |
| pH<br>LOD<br>Acid Value<br>Saponification Value<br>Specific Gravity<br>Iodine Value<br>Refractive index<br>Peroxide Value | pH<br>LOD at 105 °C<br>Acid Value<br>Saponification Value<br>Viscosity<br>Total fat<br>Total acidity<br>Thermal Stability<br>Spreadability |
| MICROBIOLOGY ANALYSIS                                                                                                     | MICROBIOLOGY ANALYSIS                                                                                                                      |
| Total bacterial count                                                                                                     | Total plate count for bacteria                                                                                                             |
| Total yeast and mould count                                                                                               | Total Yeast and Mould count                                                                                                                |
| Escherichia coli                                                                                                          | Escherichia coli                                                                                                                           |
| Salmonella typhi                                                                                                          | Salmonella typhi                                                                                                                           |
| Pseudomonas aeruginosa                                                                                                    | Pseudomonas aeruginosa                                                                                                                     |
| Staphylococcus aureus                                                                                                     | Staphylococcus aureus                                                                                                                      |
| HPTLC Analysis                                                                                                            | HPTLC Analysis                                                                                                                             |

## RESULTS

### PHARMACEUTICAL STUDY

**Table No. 5: Observations on Preparation of *Kalka*.**

|                                                                          |       |
|--------------------------------------------------------------------------|-------|
| Weight of each ingredient Powder                                         | 25g   |
| Total weight of <i>Kalka</i> after mixing all powdered ingredients       | 200g  |
| Weight of <i>Kalka</i> residue obtained after filtration of <i>Taila</i> | 185 g |
| Difference in weight                                                     | 15g   |
| Weight loss                                                              | 15g   |
| Percentage of weight loss                                                | 7.5 % |

**Table No 6: Observations on Preparation of *Taila*.**

|                   |                                     |        |
|-------------------|-------------------------------------|--------|
| Quantity Prepared | 780ml                               |        |
|                   | Quantity of <i>tila Taila</i> added | 900ml  |
|                   | Change in weight                    | Loss   |
|                   | Weight Loss                         | 120ml  |
|                   | %of weight loss                     | 13.33% |
| Color             | Orange                              |        |
| Odour             | Characteristic                      |        |

**Table No 7: Observations of preparation of *Vipareeta Malla Taila* Ointment.**

|                   |                                                |      |
|-------------------|------------------------------------------------|------|
| Quantity Prepared | 126g                                           |      |
|                   | Quantity of <i>Vipareeta Malla Taila</i> taken | 108g |
|                   | Quantity of purified bees wax taken            | 18g  |
| Color             | Orange                                         |      |
| Odour             | Characteristic                                 |      |
| Texture           | Semi-solid mass                                |      |

**ANALYTICAL STUDY****Table No. 8: Result of Analysis of *Tila Taila*.**

|                         |                |
|-------------------------|----------------|
| <b>Color</b>            | Pale Brown Oil |
| <b>Odour</b>            | Characteristic |
| <b>Refractive index</b> | 1.462          |
| <b>Specific gravity</b> | 0.92           |

**Table No. 9: Result of Analysis of Bees Wax.**

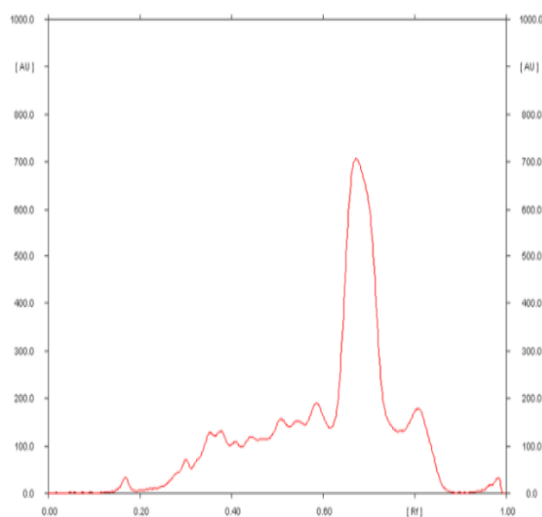
|                      |                  |
|----------------------|------------------|
| <b>Description</b>   | Yellowish Brown  |
| <b>Odour</b>         | Honey like odour |
| <b>Acid Value</b>    | 5.00             |
| <b>Melting point</b> | 65°C             |

**Table No: 10 Results on Analytical Study of *Vipareeta Malla Taila* and Ointment.**

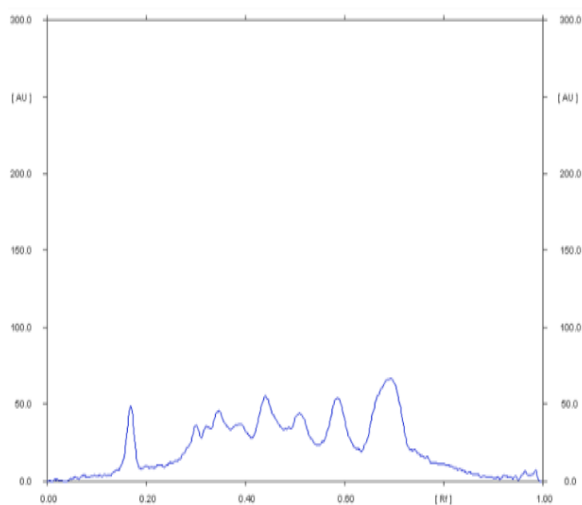
| TEST PARAMETER              | VIPAREETA MALLA<br>TAILA | VIPAREETA MALLA TAILA<br>OINTMENT |
|-----------------------------|--------------------------|-----------------------------------|
| <b>Description</b>          | Orange color Viscous Oil | Orange colored semisolid mass     |
| <b>pH</b>                   | 4.2                      | 4.90                              |
| <b>LOD</b>                  | 0.17%w/w                 | 1.11%mass                         |
| <b>Specific Gravity</b>     | 0.94                     | -                                 |
| <b>Acid Value</b>           | 3.10                     | 5.59                              |
| <b>Iodine Value</b>         | 103.68                   | -                                 |
| <b>Saponification Value</b> | 184.90                   | 180.99                            |
| <b>Refractive index</b>     | 1.462                    | -                                 |

|                                       |         |            |
|---------------------------------------|---------|------------|
| <b>Peroxide Value</b>                 | 63.18   | -          |
| <b>Viscosity</b>                      | -       | 3629 cP    |
| <b>Total fat</b>                      | -       | 80.72%mass |
| <b>Total acidity</b>                  | -       | 0.82 %     |
| <b>Spreadability</b>                  | -       | 30g cm/s   |
| <b>Thermal Stability</b>              | -       | Complies   |
| <b>MICROBIOLOGY ANALYSIS</b>          |         |            |
| <b>Total bacterial count</b>          | 20cfu/g | < 10 CFU/g |
| <b>Total yeast and mould count</b>    | 10cfu/g | < 10 CFU/g |
| <b><i>Escherichia coli</i></b>        | Absent  | Absent     |
| <b><i>Salmonella typhi</i></b>        | Absent  | Absent     |
| <b><i>Pseudomonas aeurogenosa</i></b> | Absent  | Absent     |
| <b><i>Staphylococcus aureus</i></b>   | Absent  | Absent     |

### HPTLC Analysis of *Vipareeta Malla Taila* and Ointment



Graph 1: Overview graph of *Vipareeta Malla Taila* sample at 254nm.



Graph 2: Overview graph of *Vipareeta Malla Taila* sample at 366nm.

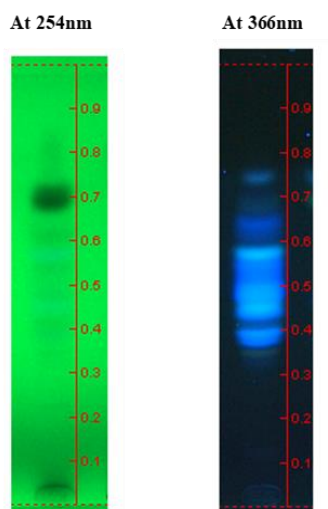
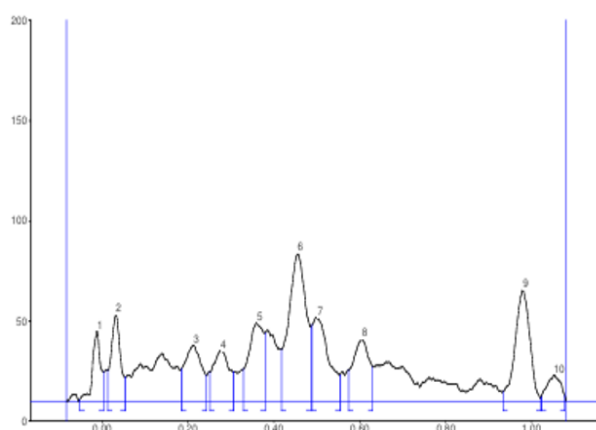
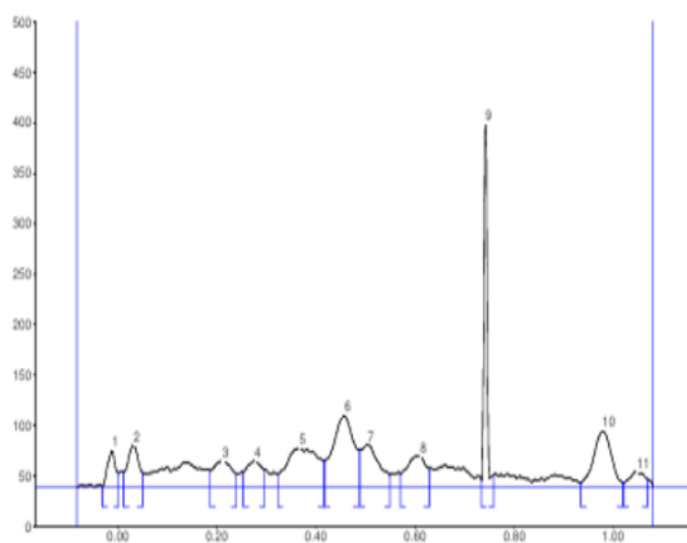


Fig. 23: TLC plate views of *Vipareeta Malla Taila* sample.



Graph 3: Overview graph of *Vipareeta Malla Taila* ointment sample at 254nm.



Graph 4: Overview graph of *Vipareeta Malla Taila* ointment sample at 366nm.

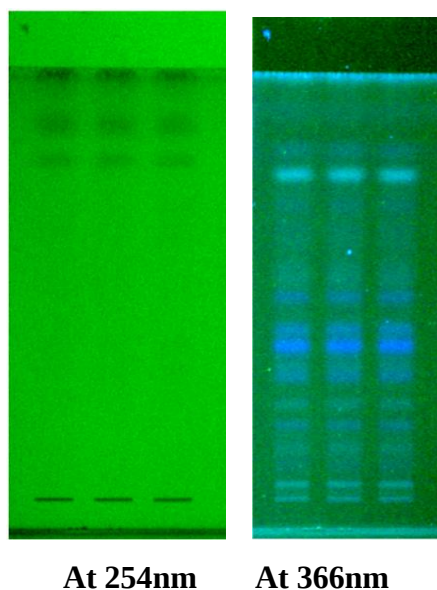


Fig. 24: TLC plate views of *Vipareeta Malla Taila* ointment.

## DISCUSSION

Preparation of the formulation as *sneha kalpana* may be considered appropriate because the formulation contains several drugs with bioactive constituents that are likely to have good solubility in lipid media, such as aconitine in *vatsanabha*, plumbagin in *chitraka*, and sulphur-containing compounds and essential oils in *rasona*. During *sneha paka*, the aqueous phase may facilitate the extraction of water-soluble constituents from drugs such as *sharapunkha* and *langali*, which are subsequently transferred into the lipid medium through the *kalka*. Thus, *sneha kalpana* is considered to facilitate the extraction of both lipid- and water-soluble constituents while producing a lipid-based formulation that may be suitable for topical application.

Preparation of *Vipareeta Malla Taila* was carried out according to the classical principles of *sneha kalpana*. Fine powdering of the herbal ingredients was essential to ensure uniform mixing and to increase the surface area available for extraction of phytoconstituents into the oil. Grinding of *Hingu* was challenging because of its sticky resinous nature, whereas *Sharapunkha* required prolonged grinding due to its fibrous texture. Nevertheless, a homogeneous *kalka* of fine consistency was obtained, facilitating efficient extraction during *taila* preparation.

During the heating process, the sequential appearance of *sneha paka lakshanas* confirmed the progressive stages of oil preparation. Initial *phena udgama* indicated the presence of moisture and volatile constituents, while the appearance of *madhyama paka lakshanas*, including

proper *varti* formation, suggested adequate progression of the process. Heating was terminated on attainment of *khara paka lakshanas*, characterized by a sand-like, granular *kalka* and the absence of crackling when exposed to fire, indicating complete removal of moisture. This stage is considered ideal for externally applied medicated oils, as minimal moisture content enhances formulation stability, reduces microbial contamination, and prolongs shelf life.

*Giri Sindoor* was incorporated into the lukewarm *taila* to minimize thermal degradation and preserve the integrity of the formulation. The final yield of 780 ml, with a processing loss of 13.3%, can be attributed to evaporation during heating, absorption of oil by the *kalka*, and unavoidable losses during filtration. Such processing losses are commonly encountered during the preparation of medicated oils and are considered acceptable.

### Preparation of *Vipareeta Malla Taila* Ointment

*Vipareeta Malla Taila* was converted into an ointment to improve its pharmaceutical elegance, stability, and patient acceptability. Beeswax was selected as the ointment base because of its compatibility with medicated oils and its ability to produce a stable semisolid preparation. The double boiling method provided gentle and controlled heating, thereby minimizing thermal degradation of the active constituents while ensuring uniform incorporation of the beeswax into the *taila*.

Filtration of the *taila* and incorporation of finely sieved *kalka* resulted in a smooth, non-gritty ointment with uniform consistency. The semisolid dosage form also ensured homogeneous dispersion of *giri sindoor*, and enhanced ease of application, storage, and transport. Collectively, these pharmaceutical modifications are expected to improve the stability, patient compliance, and therapeutic performance of the formulation.

### Discussion of Analytical Parameters

The analytical evaluation demonstrated that both *Vipareeta Malla Taila* and its ointment formulation possessed acceptable physicochemical characteristics. The pH of the *taila* (4.2) indicated a slightly acidic nature, which is generally considered suitable for topical application. Low loss on drying values for both the *taila* (0.17% w/w) and ointment (1.11% w/w) suggested minimal moisture content, which may reduce the risk of microbial contamination and contribute to better stability during storage. The specific gravity (0.94) and

refractive index (1.462) of the *taila* were comparable to the characteristics of sesame oil, indicating retention of the base oil properties after processing.

The acid values of the *taila* (3.10) and ointment (5.59) were within acceptable limits, indicating low levels of free fatty acids and minimal hydrolytic degradation. The saponification values of the *taila* (184.90) and ointment (180.99) were also comparable with those of sesame oil, suggesting that the fatty acid composition remained largely unaltered during preparation. The iodine value (103.68) reflected the presence of unsaturated fatty acids, which may contribute to good spreadability and facilitate topical application. The peroxide value (63.18) indicated the presence of oxidative products, which may be attributed to the unsaturated nature of the oil and thermal exposure during processing. Therefore, this parameter should be considered while assessing the oxidative stability and storage characteristics of the formulation.

The ointment exhibited a viscosity of 3629 cP and a spreadability of 30 g·cm/s, indicating appropriate consistency for topical application. These properties are expected to facilitate uniform application, adequate skin adherence, and prolonged retention at the site of application. The total fat content (80.72% w/w) confirmed the lipid-rich nature of the formulation, which may enhance emollient properties and support dermal absorption of the active constituents. The low total acidity (0.82%) and satisfactory thermal stability further indicate that the ointment is physically stable and suitable for storage and topical use.

### Microbiology Analysis

The microbial analysis showed low total bacterial and yeast and mould counts, indicating minimal microbial contamination and good formulation stability. The absence of *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* confirmed the microbiological safety and quality of the formulation for external application.

### Discussion of HPTLC Analysis

The HPTLC fingerprinting of *Vipareeta Malla Taila* and its ointment was performed at 254 nm and 366 nm to establish the characteristic chromatographic profile and assess the retention of phytoconstituents after conversion into ointment form. The presence of multiple peaks at both wavelengths indicates the occurrence of diverse phytochemical constituents in the formulation.

The *taila* showed a higher number of peaks at 254 nm, representing various UV-absorbing compounds, while peaks observed at 366 nm indicated the presence of fluorescent constituents. The variation in peak intensity and number between the two wavelengths suggests the presence of compounds with different chemical properties. The wide range of R<sub>f</sub> values reflects the presence of constituents with varying polarity, which may be attributed to the extraction of diverse phytoconstituents during *Sneha Paka*.

The HPTLC profile of the ointment demonstrated comparable chromatographic characteristics with the *taila*, indicating that the conversion process using beeswax did not significantly alter the phytochemical profile of the formulation. Although differences in relative peak intensity and dominant peaks were observed, these may be due to the influence of the ointment base on the dispersion and detection of constituents. The presence of common chromatographic bands in both formulations suggests retention of the major phytoconstituents after transformation from *taila* to ointment.

Overall, the HPTLC fingerprint profile serves as a characteristic quality control parameter for *Vipareeta Malla Taila* and its ointment, confirming consistency of the formulation and preservation of its phytochemical constituents during pharmaceutical modification.

## CONCLUSION

The present study established the pharmaceutical and analytical profile of *Vipareeta Malla Taila* and its ointment through physicochemical, microbiological, and HPTLC evaluations. The formulation complied with acceptable quality parameters, exhibited microbiological safety, and generated a characteristic HPTLC fingerprint that can serve as a reference for standardization and quality control.

## LIMITATIONS AND FUTURE SCOPE

Phytoconstituent profiling of the formulations was not carried out in the present study and is recommended for future research.

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