# Integrated Classical Ayurveda with Modern Science: Preparation, Standardization and Analytical Evaluation of ArkaManahshila Tail using Physicochemical Analysis

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**Abstract- Background: *Arkamanahshila Tail*, a classical Ayurvedic medicated oil containing *Arka patra* (*Calotropis gigantea*), *Manahshila* (Realgar, $As_2S_2$), and Mustard oil has been traditionally used for external therapeutic applications. Integrating Ayurvedic preparation principles with modern analytical techniques ensures both authenticity and quality assurance. Objective: To prepare *Arkamanahshila Tail* using the classical *Taila Paka Vidhi*, followed by standardization and physiochemical analysis for quality evaluation. Methods: Authenticated raw materials were processed according to classical *Sneha Kalpana* procedures. The oil was prepared by incorporating *Sudhha Manahshila kalka* into Murchhita Katu Taila (Mustard oil) with the prescribed liquid medium of Arka Patra Swaras and heated to *Madhyama Paka* stage. Standardization parameters were recorded, and physicochemical analysis was performed, including specific gravity, refractive index, acid value, saponification value, and moisture content, to assess quality and stability. Results: The prepared oil met both classical quality indicators and modern analytical standards, exhibiting characteristic odor, uniform consistency, and physicochemical parameters within acceptable ranges. Conclusion: The integration of classical Ayurvedic preparation with modern analytical evaluation provides a reliable approach for standardizing *Arkamanahshila Tail*, ensuring reproducibility, safety, and therapeutic potential for future clinical applications.**

**Index Terms: Arkamanahshila Tail, Ayurveda, Physicochemical Analysis, Standardization, Sneha Kalpana, Taila Paka Vidhi.**

## I.INTRODUCTION

Ayurveda, the ancient Indian system of medicine, describes numerous *Sneha Kalpana*[1] (medicated oil and ghee preparations) intended for therapeutic purposes. Among them, *Taila* preparations occupy a significant place due to their ease of application, stability, and deep tissue penetration (*Sūkṣma Vyavāyi* property). *Arkamanahshila Tail* is a classical formulation mentioned in Ayurvedic Text Chakkardatt[2], prepared by processing Murchhita Katu Taila[3] (Mustard oil) with Arka[4] Patra Swaras (*Calotropis gigantea*) and Sudhha *Manahshila Kalka*[5] (Realgar, $As_2S_2$) using the *Taila Paka Vidhi*. Traditionally, this oil has been used externally for specific disorders, leveraging the *Uṣṇa* (hot), *Tikṣṇa* (sharp), and *Kṛmighna* (antimicrobial) properties of its ingredients.

The preparation method, as per *Śārṅgadhara Saṃhitā* and other authoritative texts, follows the principles of *Madhyama Paka*[6], ensuring optimal extraction of active constituents without compromising stability. However, in contemporary practice, ensuring the authenticity, purity, and safety of such formulations requires bridging traditional methods with modern quality control protocols. Physicochemical standardization, including evaluation of parameters such as specific gravity, refractive index, acid value, and saponification value, plays a crucial role in establishing reproducibility and therapeutic reliability.

In this study, *Arkamanahshila Tail* was prepared following classical guidelines, and subjected to standardization and physicochemical analysis to

verify its quality attributes. This integrative approach not only validates the formulation but also supports its safe application in current clinical practice.

## II. AIMS AND OBJECTIVES

- To collect authentic raw materials, process and prepare *Arkamanahshila Tail* by following the *Sneha Kalpana* methodology under controlled conditions.
- To assess classical quality markers such as *Madhyama Paka Lakshanas* (indications of proper oil processing).
- To conduct physicochemical tests, including specific gravity, refractive index, acid value, saponification value, and moisture content for quality ssurance.
- To document a reproducible protocol integrating Ayurvedic tradition with scientific validation for future research and clinical application.

## III. MATERIALS AND METHODS:

Present work of Pharmaceutico-analytical study of ArkaManahshila Taila was divided into two parts:

1. Pharmaceutical study
2. Analytical study

1. Pharmaceutical study

The pharmaceutical study was conducted to prepare *Arkamanahshila Tail* in accordance with the principles of *Sneha Kalpana* as described in classical Ayurvedic texts. The process involved careful selection, authentication, purification, and proportionate combination of ingredients, followed by controlled heating to obtain the desired quality of medicated oil. It is divided into the following sections:

A. Collection of raw materils.
B. Preparation of ArkaManahshila Taila.

Collection of raw materials

ArkaManahshila Taila is a herbomineral formulation having three ingredients in its composition which were provided by Post Graduate Department of Rasashastra and Bhaishajya Kalpana, Govt. Ayurvedic College Patna, Bihar after proper authentication. The herbal materials were authenticated by the pharmacognosy laboratory of Post Graduate Department, Govt. Ayurvedic College Patna, Bihar. All the components were separated from physical impurities like small stones, sand particles, dust etc.

*Arka* (*Calotropis gigantea*) fresh leaves – collected from a pesticide-free local areas of patna.

Preparation of ArkaManahshila Taila

There were the four steps carried out in pharmaceutical processes:-

- Sodhana ( purification ) of Manahshila.
- Katu Taila Murchhana.
- Preparation of Arka Patra Swarsa.
- Preparation of ArkaManahshila Taila.

Shodhana of Manahshila
Reference - Rasatarangani 11/111
Date of starting - 15.06.2021
Date of completion- 5.07.2021

Requirement: -

Apparatus – Khalva yantra, Kharal yantra.
Ingredient - Manahshila, Nimbu swarasa.

Procedure:- Firstly, Manahshila was taken and made a coarse powder with the help of khalva yantra.Then, coarse powder of Manahshila was put in kharal yantra, made wet with Nimbu swarasa and triturated for 3 hr. to complete one bhavna. This process was repeated 7 times so as to give seven bhavna to manahshila for its shodhana. After the completion of all seven bhavna, purified Manahshila was dried in sunrays. Finally, powder was prepared with purified and dried Manahshila with the help of khalva yanta and stored in a dry container.

Precaution: -

- Process of trituration should be done carefully.
- Gloves should be used during all procedures.

Katu Taila Murchhana
Reference - Bhaishajya Ratnavali, Jwararogaadhikara 5/1269-70
Date of starting - 5.8.2021
Date of Completion - 10.8.2021

Ingredients– Katu Taila, Kalka Dravyas as mentioned in below table and Water.

Apparatus and Utensils- Wide mouth utensil, Gas stove, Cloth, Spatula, Mortar and pestle, Stone with pestle, Balance.

Table No.1. Quantity of ingredients for Murchhana:

| S.No. | Ingredients | Quantity |
|---|---|---|
| 1. | Katu Taila | 25 liters |
| 2. | Manjistha | 3kg |
| 3. | Haritaki phala beej rahit | 390gm |
| 4. | Vibhitaki phala beej rahit | 390gm |
| 6. | Haridra churna | 390gm |
| 7. | Nagarmotha | 390gm |
| 8. | Hauber | 390gm |
| 9. | Nalika | 390gm |
| 11. | Kache bel ki guddi | 390gm |
| 12. | Kala jeera | 390gm |
| 13. | Water | 100kg |
| 10. | Dadim beej | 390gm |

Procedure-

a. The mentioned murchhana dravyas as in table no. were made into yavakut churna with the help of mortar pestle. The yavakut churna was dipped into water. The quantity of water was taken 4 times that of kalka dravyas.
b. Next day, the above soaked kalka dravyas were grinded to make a coarse paste.
c. Then Katu Taila was poured into a wide mouth utensil and kept on the gas stove. Moderate heat was given continuously to the oil till it gets heated to above 167 $^0$C.
d. When the water content of the oil gets evaporated then utensil of oil was removed from gas stove and leave for some time to let it cool.
e. When temperature of oil reached around 70$^0$C, then the murchhita kalka dravyas were added slowly to the oil and utensil of oil put back to the gas stoves and start a mild heat again.
f. Continuously stir the oil to avoid burning of kalk dravyas.
g. Now 4-time quantity of water i.e 100 liter was added to oil and paka process of oil continues.
h. When the water content of the oil was evaporated and signs of taila paka appears (as signs of taila paka for murchhana process is not mentioned in any ayurvedic texts so here Sneha Siddhi Lakshana mentioned in Sneha kalpna of Sharangdhar Samhita is consider for completion of paka process) then the heat was stopped and it was removed from the gas stove to let it cool.
i. The oil after cooling down was filtered through cotton cloth and was stored in a clean and dry glass container.

Precautions –

a. Paka kriya should be done at Madhyam agni.
b. When kalka dravyas was added, sound appears and oil spills. So, one should be very careful during this process.
c. Continuous and careful stirring is required during process, otherwise yavakut churna would stick on to the bottom of the vessel.
d. When water in the oil got reduced, gas flame should be slow down to maintain a constant temperature.
e. Big vessels should be taken for the murchhana of large quantity of oil.
f. When froth appears in the Taila, the temp was maintained to protect the Taila coming out from vessel.
g. Packaging of murchhita oil should be done carefully to avoid loss during packaging.

Preparation of Arka Patra Swarsa.

Reference - Sharangdhara Samhita, Madhyam Khand 1/21-24

Date of starting - 11.8.2021

Date of completion- 14.8.2021

Requirements: -

Apparatus- Big buckets, Trays, big pan, knife, cloth,utensils .

Ingredients- Arka patra, thread, banana leaves, wheat flour, multani soil, Cow dung cakes.

Procedure-

a) First of all, arka patra was collected from plants and washed with water to cleaned up.
b) Then, leaves were chopped into small pieces with the help of sharp instrument.
c) The chopped leaves were triturated in a clean mixer grinder (or stone mortar & pestle) without adding any water, to obtain a fine, homogeneous paste (*Kalka*).
d) The paste was wrapped in a double-layered muslin cloth and pressed manually to extract the juice.
e) The expressed juice (*Swarasa*) was collected in a clean, dry glass vessel.

Precaution

a. Ensure thorough washing of leaves to remove dust, dirt, and microbial contaminants.
b. The leaves should be chopped properly so that the fire can distributed evenly.

Preparation of ArkaManahshila Taila

Reference- Chakradatta 50/159

Date of starting - 12.08.21

Date of completion- 20.08.21

Requirements: -
Apparatus - Wide mouth utensil, Gas stove, Cloth, Spatula, Mortar pestle, Stone with pestle, Balance etc.
Ingredient- Murchhita Katu Taila, Sudha Manahshila, Arka patra swarsa.

Table No. 2. Quantity of ingredients for preparation of ArkaManahshila Tail:

| S.No. | Ingredients | Quantity |
|---|---|---|
| 1. | Murchhita Katu Taila | 18 liters |
| 2. | Sudha Manahshila | 4.475 kg |
| 3. | Arka Patra swarsa | 72 liters |

Procedure-

a) Firstly, kalka Dravya i.e Sudha Manahshila churna was taken in a wide mouth utensil and made it wet by pouring some water, so that it does not burn when added in hot oil.
b) Now, in another container Murchhita Katu Taila was taken and was kept over the gas stove and mild heat was given.
c) When the oil gets heated then kalka dravya, which was made into paste earlier, was added slowly. This time ebullition in the oil occurs. So, gas stove was slow down to reduce the heat.
d) While pouring the kalka continuously stir the oil, so that it does not stick to bottom of container.
e) Afterwards, the filtered Arka patra swarsa was added to the oil and was given mild heat continuously for its paka kriya.
f) Time- to- time stirring was done to prevent the kalka dravya to stick at the bottom of the utensil.
g) After continued heating the water content of the katu taila starts reducing. When complete water content gets evaporated and when the signs of samayak Sneha Siddhi Lakshana appears then the heat was turned off and the oil was filtered in a container with the help of clean cloth. It was kept for some time to cool to luke warm.

Precautions-

a. Paka should be done at mild to moderate heat.
b. Time-to-time stirring must be done to prevent the kalka dravya to stick at the bottom of the containesize vessel was tareafgh handling of oil.
c. Kalka dravya was added slowly to avoid spilling of oil.

Image show process involves in preparation of Arkamanahshila Taila.

2. Analytical study

The prepared medicated oil was subjected to a series of physicochemical analyses to ensure quality, stability, and reproducibility. The following parameters were evaluated as protocol for Testing of Ayurvedic, Siddha and Unani medicines published by Dept. of AYUSH, Govt. of India (on recommendation of PLIM Ghaziabad).[7]

Test Parameters –

A. General/ Organoleptic Examinations-
   1. Colour
   2. Appearance
   3. Odour
   4. Touch

B. Physiochemical Analysis-
   1. Detection of Mineral Oil
   2. Rancidity Test
   3. Specific gravity
   4. Peroxide Value
   5. Refractive Index
   6. Acid Value
   7. Iodine Value
   8. Saponification Value
   9. Unsaponifiable Matter
   10. Total Fatty Matter
   11. Viscosity
   12. Loss on drying
   13. Heavy metal test.
   14. Thin Layer Chromatography

C. Microbiological Analysis
   15. Total Bacterial Count
   16. Total Fungal Count

Place of test- S.R. LABS, Pratap Nagar, Sanganer, Jaipur (An AYUSH Approved laboratory).

## IV. OBSERVATION AND RESULTS

1. Observation of Pharmaceutical study

Table no.3 Observations after Purification (*Shodhana*) of Manahshila

| Stage of Process | Observation Parameter | Findings |
|---|---|---|
| Before Shodhana | Color | Bright orange-red crystalline powder |
| | Texture | Coarse, brittle |
| | Odor | Odorless |
| | Floating property | Heavier particles settled quickly in liquid |
| After Shodhana | Color | Uniform deep orange-red |
| | Texture | Fine powder, less brittle |
| | Odor | Earthy aroma |
| | Purity | Free from visible foreign particles; cleaner appearance |

Table no.4 Quantity Changes During Purification (*Shodhana*) of Manahshila

| Parameter | Weight (g) | Remarks |
|---|---|---|
| Initial Raw *Manahshila* | 4.5 kg | Before purification process |
| Final Purified *Manahshila* | 4.475kg | After drying in shade |
| Weight Loss During *Shodhana* | 0.025kg | Due to removal of impurities and moisture |

Table no.5 Extraction of Arka patra Swarasa.

| Quantity of leaves taken | Quantity of swarasa obtained |
|---|---|
| 150 kg | 72 liters |

Table no.6Quantity changes during Katu Taila Murchhana

| Parameter | Weight (g) | Remarks |
|---|---|---|
| Crude katu taila. | 25 liters | Before murchhana |
| Murchhita katu taila | 18 liters | After murchhana process |
| Weight Loss | 7 liters | Due to removal of moisture |

Table No.-7 Quantity Details of Obtained Arkamanahshila Tail.

| Parameter | Weight (g) | Remarks |
|---|---|---|
| Murchhita katu taila. | 18 liters | Before Taila Paka Process |
| ArkaManahshila Taila | 15 liters | After Taila Paka and filteration |
| Weight Loss | 3 liters (17%) | Due to removal of moisture |

Table no.8 Observations During Taila Paka Process of Arkamanahshila Tail

| S.No. | Name of the Test | Materials | Results |
|---|---|---|---|
| 1. | Odour | Whole product | Characteristic oily odour with smell of kalka dravyas |
| 2. | Colour | Whole product | Reddish-Brown |
| 3. | Fire test | Katu Taila | Burns without any crackling sound. |
| 4. | Taste | Katu Taila | Oily astringent. |
| 5. | Stickiness Test | Kalka | Non sticky |
| 6. | Consistency Test | Kalka | Thick |
| 7. | Varti | Kalka | Formation of vartiapp-earance of finger prints on varti |
| 8. | Phenodgam | Katu Taila | Phena appears at the last stage of the paka. |

2. Observation of Analytical study

Table no.9 Result of Analytical Study of Arka Manahshila Taila.

| Parameters | Results | Reference |
|---|---|---|
| Physio Chemical Analysis | | |
| Detection of mineral oil | Absent | API PART I, Vol.-VI, 2009 |
| Rancidity test | Absent | API PART I, Vol.-VI, 2009 |
| Specific Gravity | 0.9539 | API PART I, Vol.-VI, 2009 |
| Peroxide value | 3.34m eq of O2/kg | API PART I, Vol.-VI, 2009 |
| Refractive index | 1.484 | API PART I, Vol.-VI, 2009 |
| Acid value | o.88 mg KOH/g | API PART I, Vol.-VI, 2009 |
| Iodine value | 95.59 | API PART I, Vol.-VI, 2009 |
| Saponification value | 206.8 mg KOH/g | API PART I, Vol.-VI, 2009 |
| Unsaponifiable Matter | 2.47 %W/W | API PART I, Vol.-VI, 2009 |
| Total Fatty Matters | 91.49 %W/W | API PART I, Vol.-VI, 2009 |
| Viscosity | 43.1 cP | API PART I, Vol.-VI, 2009 |
| Loss on Drying | 1.56 %W/W | API PART I, Vol.-VI, 2009 |
| Heavy Metal Analysis | | |
| Lead (Pb) | 0.01 ppm | SRL/CHEM/SOP/ICP-MS/13 |

| | | |
|---|---|---|
| Cadmium (Cd) | 0.01 ppm | SRL/CHEM/SOP/ICP-MS/13 |
| Arsenic (As) | 259.49 ppm | SRL/CHEM/SOP/ICP-MS/13 |
| Mercury (Hg) | 0.26 ppm | SRL/CHEM/SOP/ICP-MS/13 |
| Micro Biological Analysis | | |
| Total Fungal Count cfu/ml | <10 | API PART I, Vol.-VI, 2009 |
| Total bacterial count cfu/ml | <10 | API PART I, Vol.-VI, 2009 |

## V. DISCUSSION

The preparation of *Arkamanahshila Tail* strictly following classical *Sneha Kalpana* principles ensures adherence to Ayurvedic pharmaceutics, which emphasize not only the therapeutic potency but also the quality and stability of the formulation. The use of *Arka* (*Calotropis gigantea*), known for its anti-inflammatory, analgesic, and antimicrobial properties, combined with *Manahshila* (Realgar, $As_2S_2$), traditionally valued for its *Kṛmighna* (antiparasitic and antimicrobial) activity, underlines the rationale behind this formulation's external use.

The process of *Taila Paka* at *Madhyama* (medium) heat facilitated proper infusion of active principles while preventing degradation of heat-sensitive constituents. The classical sensory parameters—such as color, odor, and consistency—were consistent with descriptions from Ayurvedic texts, confirming authentic preparation.

Physicochemical analyses such as specific gravity, refractive index, acid value, and saponification value provide objective measures to assess quality and stability. The acid value, indicating free fatty acid content, remained within acceptable limits, suggesting minimal hydrolytic rancidity. The saponification value aligned with typical ranges for medicated oils, indicating adequate triglyceride composition and processing. Refractive index and specific gravity values also supported the integrity of the oil base and successful incorporation of herbal ingredients.

In present study, all the standard criteria in the preparation of drug has been fulfilled but as found in analytical study the amount of arsenic present in drug was 259.49 ppm which is much above the permissible limit mentioned in API. Further more the main ingredient in Arkamanahshila Taila itself is Arsenic, due to which it is quit obvious that arsenic present in the drug is very much high. This does not indicates that the drug is toxic, because in Ayurveda, specific processing techniques like (Shodhana, Marana etc.) removes the hazardous properties from drugs. In other words different pharmaceutical procedures for minerals and metals convert them into bio-assimilable form (in-organic to organic) which in turn non-toxic to the human body.

In present study Manahshila was processed (Shodhana) with Nimbu Swaras due to which in-organic form of arsenic is converted into organic form which is non-toxic for therapeutic use. This can be confirmed as non of the patient shows any toxic symptoms like irritation and rashes etc. So, considering the above facts, it can be said that, the prepared drug is non-toxic even if the arsenic level is high.

Comparing these results with previously reported data on similar formulations indicates that the preparation was reproducible and stable, making it suitable for therapeutic use. Furthermore, the integration of traditional organoleptic evaluation with modern physicochemical analysis bridges the gap between Ayurvedic wisdom and contemporary pharmaceutical standards, enhancing trustworthiness and acceptance of classical formulations.

## VI. CONCLUSION

The successful preparation of *Arkamanahshila Tail* following classical Ayurvedic *Taila Paka Vidhi* has been demonstrated, with the formulation exhibiting characteristic organoleptic properties and physicochemical parameters consistent with quality standards. The integration of traditional preparation techniques with modern analytical evaluation ensures the authenticity, stability, and reproducibility of the oil. This study establishes a standardized approach for *Arkamanahshila Tail*, paving the way for further pharmacological and clinical investigations to validate its therapeutic efficacy and safety in contemporary Ayurvedic practice.

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