

A RECENT REVIEW ON FORMULATION, EVALUATION, AND THERAPEUTIC SIGNIFICANCE OF ARKA TAILA

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ABSTRACT

Arka Taila is an Ayurvedic medicated oil prepared from *Calotropis gigantea* using a traditional sesame or mustard oil base, widely used for pain, inflammation, and skin disorders. Although its therapeutic use is well documented, scientific validation of its physical and chemical characteristics is limited. The present study aimed to prepare Arka Taila and evaluate its analytical profile. Physico-chemical parameters including specific gravity, viscosity, refractive index and chemical parameters such as acid value, iodine value, saponification value, unsaponifiable matter, and peroxide value were assessed. HPTLC profiling was performed to identify phytochemical markers. These analytical findings support standardization of Arka Taila, helping establish its identity, purity, and quality for future research and clinical application.

KEYWORDS: Kandugna, Kushtagna, Vranaropana, and shothagna.

1. INTRODUCTION

Arka Taila is an anubhoota yoga (experientially validated formulation) prepared using Arka leaves, dried ginger, and mustard oil. Traditionally, it is known for its therapeutic actions such as anti-skin diseases, anti-itching, and its usefulness in conditions like paama, vicharchika, kachchu, and inflammation. Arka leaves are rich in active compounds like calactin, calotoxin, calotropins D1 & D11, and giganteol acid, which contribute to their medicinal value especially in managing skin disorders such as vicharchika. In Ayurveda, the preparation of medicated oils such as Arka Taila falls under Sneha Kalpana, a specialized branch of pharmaceutical processing. As Ayurveda becomes more globally recognized, standardization and quality control of traditional formulations have become increasingly important. To achieve this, analytical evaluation plays a crucial role. Parameters such as physico-chemical properties and chromatographic profiles help establish the identity, purity, and strength of the final product. Without such analytical studies, any formulation remains scientifically incomplete. These analyses provide

essential benchmarks that help assess the quality, safety, and reproducibility of Arka Taila in both research and clinical settings.^[1,2]



FIG NO. 1: *Calotropis Gigantea*.

2. PHARMACOGNOSTIC PROFILE OF ARKA

❖ Botanical Information

- Scientific name: *Calotropis gigantea* (L.) R. Br.
- Family: Apocynaceae (formerly Asclepiadaceae)
- Common names: Arka (Sanskrit), Madar (Hindi), Giant Milkweed (English), Rui, Erukku
- Synonyms: *Calotropis procera* (Rakta Arka), *Calotropis gigantea* (Shweta Arka)^[3]
- Genus: *Calotropis*
- Species: *gigantea*
- Parts Used: Leaves, latex, roots, flowers, and root bark^[4]

❖ Vernacular Names

- Sanskrit – Arka
- Hindi – Madar
- Marathi – Rui
- Tamil – Erukku
- Telugu – Jilledu
- English – Giant milkweed or Crown flower.

❖ Biological Source

The drug Arka consists of the dried or fresh aerial and subterranean parts of *Calotropis gigantea* (Linn.) R. Br., and *Calotropis procera* Dryand.

The drug mainly consists of the fresh leaves, roots, flowers and milky latex of the plant.^[5]

❖ Chemical Constituents

All plant parts are rich in cardenolides, flavonoids, triterpenoids, alkaloids, saponins, tannins, and sterols, which account for the wide pharmacological profile of the drug.

A. Latex

- Cardiac glycosides (cardenolides): calotropin, calotoxin, uscharin, uscharidin, calactin, gigantol
- Proteolytic enzymes: calotropain I & II, gigantase
- Sterols: β -sitosterol, stigmasterol
- Resins, rubber, and sugars

B. Leaves

- Flavonoids: quercetin, kaempferol, rutin, isorhamnetin
- Triterpenoids: β -amyrin, α -amyrin, lupeol, taraxasterol
- Phenolic acids: ferulic acid, vanillic acid, caffeic acid
- Saponins and tannins

C. Roots and Root Bark

- Cardenolides: calotropin, uscharidin, gigantol
- Triterpenoids and alkaloids
- Fatty acids: palmitic, stearic, oleic, linoleic acids

D. Flowers

- Flavonoids and glycosides (quercetin derivatives)

- Volatile oils imparting mild fragrance and antimicrobial properties.

3. LITERATURE REVIEW

3.1 Geographical Areas of Arka — *Calotropis gigantea*

• Global Distribution

Calotropis gigantea (Arka) is a perennial shrub widely distributed in tropical and subtropical regions. It is found in South Asia, Southeast Asia, Africa, and parts of the Arabian Peninsula. The plant thrives in dry, waste, and sandy soils and is often seen on roadsides and open lands.^[6]

• Distribution in India

In India, Arka grows abundantly throughout the plains and lower hills up to an altitude of 900 meters. It is especially found in Maharashtra, Gujarat, Rajasthan, Tamil Nadu, Karnataka, Andhra Pradesh, West Bengal, and Uttar Pradesh.

It flourishes in regions with low rainfall and high sunlight exposure, making it a hardy plant of arid and semi-arid climates.^[7]

3.2 Historical Background of Arka

The history of Arka, a well-known medicinal shrub belonging to the family Apocynaceae, dates back to ancient Ayurvedic civilization. It has been revered for its potent therapeutic and ritualistic significance for over 3000 years in the Indian subcontinent.

• Mention in Classical Ayurvedic Texts

The earliest references to Arka are found in Atharva Veda (1500–1000 BCE), where it was described as a sacred and medicinal plant used in religious rituals, fumigation, and wound healing practices. In Charaka Samhita and Sushruta Samhita, Arka is classified under the category of semi-poisonous drug and is recommended for external application after proper purification to reduce its toxic latex content.^[8]

In the Charaka Samhita, Arka is mentioned as a sharp-acting substance with hot potency and pungent taste, used in formulations to alleviate Kapha-Vata disorders, swelling, and skin diseases. Similarly, Sushruta Samhita describes Arka as a component in formulations used for wound healing, skin eruptions, and purgative actions.^[9]

• Nighantu and Later Ayurvedic Literature

In Bhavaprakasha Nighantu (16th century CE), Arka is described as having appetizer, anti-dermatitis, and antimicrobial properties. It also specifies two varieties:

- Shweta Arka (*Calotropis gigantea*) – white-flowered type.
- Rakta Arka (*Calotropis procera*) – purple-flowered type.^[10]



FIG NO. 2: Shweta Arka / Rakta Arka.

• Macroscopic Characteristics^[11]

Part	Description
Leaf	Opposite, sessile, thick, obovate, 10–20 cm long, pale green, glabrous above, tomentose below; contains milky latex.
Stem	Erect, cylindrical, greenish-grey, exudes milky latex.
Flower	Large, waxy, white or lilac, arranged in umbellate cymes.
Fruit	Follicle, inflated, 8–10 cm, containing silky-haired seeds.
Latex	White, sticky, bitter, and irritant.

Table 1: Macroscopic Characteristics.

4. AIM AND OBJECTIVE OF THE STUDY

- To review the traditional and modern methods.
- To evaluate the physicochemical characteristics.
- To analyze the phytochemical constituents.
- To assess the reported pharmacological and therapeutic properties.
- To summarize modern research findings and experimental studies.
- To identify knowledge gaps and future research directions.

5. IDEAL PROPERTIES OF ARKA

- Free from moisture, grit, foreign particle
- Free from microbial contamination
- No rancid smell or discoloration
- Extractive values consistent with standard profiles

- TLC/HPTLC fingerprints showing presence of triterpenoids, flavonoids, cardenolides

6. ADVANTAGES OF ARKA TAILA

- Potent Anti-inflammatory and Analgesic Action
- Effective in Skin Disorders
- Deep Penetration into Skin
- Antimicrobial and Disinfectant Properties

7. DISADVANTAGES OF ARKA TAILA

- Potential Skin Irritation
- Not Suitable for Long-Term Use on Broken Skin
- Strong Odour and Sticky Nature
- Photosensitivity on Application Area
- Contraindicated in Pregnancy and Lactation
- Requires Accurate Standardization

8. INGREDIENTS^[13]

Ingredients	Botanical Name	Part Used	Quantity	Purpose
Arka leaf / flower	Calotropis gigantea (L.) R. Br.	Fresh leaf juice	4 parts	Main active ingredient
Sesame	Sesames indicum L.	Base oil	1 part	vehicle for extraction and absorption
Water	—	Purified water	16 parts	Solvent medium for decoction and extraction
Turmeric	Curcuma longa L.	Rhizome powder	1 part	Acts as an antiseptic and enhances wound healing
Saindhava Lavana	Rock salt	—	q.s	Enhances transdermal absorption

Table 2: Ingredients.

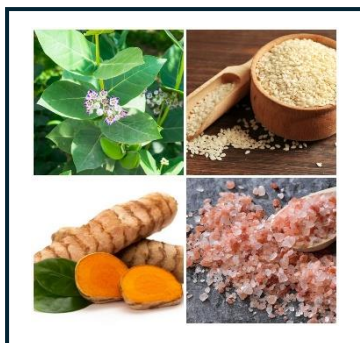


Fig No. 3: Ingredients.

9. METHOD OF PREPARATION^[12]

- The whole process is done in following steps.
- Collection of plant materials
- Preparation of plant extracts
 - a) Hot water extraction,
 - b) Solvent extraction.
- Quantitative Phytochemical analysis
 1. Total phenolic content
 2. Total flavonoid content

- Qualitative Phytochemical analysis.

Sr.No	Quality	Test
1	Test for Proteins	1. Millon's test 2. Ninhydrin test
2	Test for Carbohydrates	1. Fehling's test 2. Benedict's test 3. Molisch's test 4. Iodine test
3	Test for Glycosides	1. Liebermann's test 2. Slkowsky's test 3. Keller-Kilani test

Table 3: Qualitative Phytochemical Analysis.

❖ Preparation method of arka taila

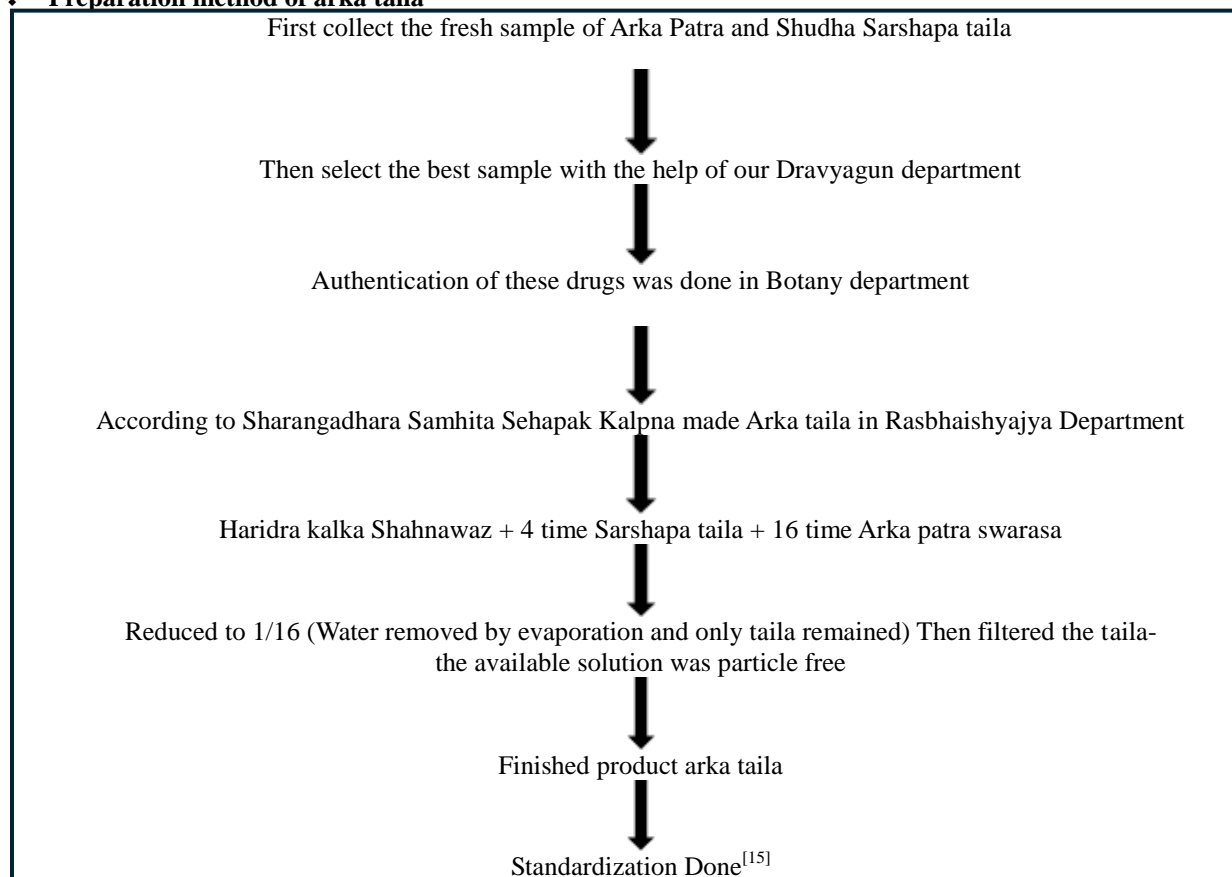


Table 4: Preparation Method.



Fig No. 4: Arka Taila.

10. EVALUATION PARAMETERS^[16]

Parameter	Evaluation Method
Organoleptic	Color (greenish-yellow), odor (characteristic), touch (smooth)
Physicochemical	Specific gravity, refractive index, acid value, iodine value, saponification value
pH	Determined using pH meter
Moisture content	By heating method
Viscosity	Measured by Ostwald viscometer
Microbial limit test	To ensure absence of pathogens
Stability testing	40°C ± 2°C / 75% RH for 3–6 months

Table 5: Evaluation Parameter.

11. THERAPEUTIC SIGNIFICANCE^[17]

Action	Ayurvedic Perspective	Modern Pharmacological Basis
Anti-inflammatory	Reduces local inflammation	Inhibits prostaglandin synthesis
Analgesic	Relieves pain	Blocks pain receptors, reduces swelling
Wound healing	Helps in healing ulcers/wounds	Promotes tissue regeneration
Antimicrobial	Useful in skin diseases	Antibacterial & antifungal activity
Kaphavatahara	Balances vitiated doshas	Improves local circulation and metabolism

Table 6: Therapeutic Significance.

12. CHEMICAL TESTS FOR ARKA TAILA

12.1 Qualitative Phytochemical Tests for Arka Taila

a. Test for Alkaloids

- **Reagent:** Dragendorff's reagent, Mayer's reagent
- **Observation:** Formation of orange/brown precipitate (Dragendorff), Formation of cream precipitate (Mayer)
- **Indication:** Presence of alkaloids such as calotropin and uscharin.

b. Test for Terpenoids

- **Reagent:** Salkowski's test
- **Procedure**
Add 2 mL chloroform + 2 mL concentrated sulfuric acid to the oil extract.
- **Observation:** Reddish-brown coloration at the interface
- **Indication:** Presence of terpenoids.

c. Test for Steroids

- **Test:** Liebermann–Burchard test
- **Procedure:** Oil + acetic anhydride + conc. H₂SO₄
- **Observation:** Emerald green or blue color
- **Indication:** Steroidal content.

d. Test for Flavonoids

- **Shinoda Test:** Add magnesium ribbon + HCl to alcoholic extract
- **Observation:** Pink/red coloration
- **Indication:** Presence of flavonoids.

e. Test for Glycosides

- **Keller–Killiani Test** (for cardiac glycosides)
- **Procedure:** Add glacial acetic acid + FeCl₃ + H₂SO₄
- **Observation:** Reddish-brown ring at the interface
- **Indication:** Presence of cardenolide glycosides (calotropin, uscharin).

12.2 Physicochemical Tests for Arka Taila

a. Acid Value

Measures free fatty acids → indicates rancidity.

Ideal: Should be low.

b. Peroxide Value

Indicates oxidative deterioration.

Should be within permissible limits.

c. Saponification Value

Determines total fatty acids.

Higher SV indicates better skin absorption.

d. Iodine Value

Measures unsaturation in oil.

Sesame oil-based Arka Taila has moderate iodine value.

e. Specific Gravity and Refractive Index

Used to confirm purity and detect adulteration.

12.3 Identification of Latex-Derived Compounds in Arka Taila

Since Arka Taila contains *Calotropis gigantea* juice, major cardenolides can be confirmed using:

a. TLC (Thin Layer Chromatography)

- **Solvent System:** Chloroform : Methanol (9:1)
- **Observation:** Spots corresponding to calotropin, uscharin, frugoside^[19]

b. HPTLC / HPLC

- **Used for standardization of:** Calotropin, Calotoxin, Uscharin^[20]

13. Future Prospects of Arka Taila

• Development of standardized formulations

More research is required to create standardized preparation protocols, ensuring batch-to-batch consistency for therapeutic use.

• Advanced analytical profiling

Modern analytical techniques can help identify marker compounds in Arka Taila for quality control.

• Pharmacological validation

Preclinical and clinical studies are needed to scientifically validate anti-inflammatory, analgesic, and wound-healing actions of Arka Taila.

• Formulation enhancement

New dosage forms like nanoemulsions, gels, transdermal patches, and aerosol sprays can improve stability and patient acceptance.

• Toxicity and safety evaluation

Detailed studies on dermal toxicity, irritation potential, and long-term safety are needed to ensure safe therapeutic use.

• Clinical trials for specific diseases

Need for controlled clinical trials assessing efficacy in arthritis, muscular pain, Vata disorders, and wound management.

• Industrial-scale production

Scope exists to develop GMP-compliant large-scale manufacturing, improving availability in Ayurvedic markets.

• Incorporation into integrative medicine

Potential for integration into modern physiotherapy and sports medicine as a natural topical anti-inflammatory agent.

Growing worldwide interest in herbal medicated oils creates market scope for exporting standardized Arka Taila products.^[21,22]

14. DISCUSSION

This review summarizes the formulation, analytical evaluation, and therapeutic potential of Arka Taila, an Ayurvedic oil prepared from *Calotropis gigantea*. Traditional and modern evidence suggests benefits in inflammation, pain, wound healing, and Vata disorders, although strong clinical validation is still lacking. Formulation quality depends on Sneha Paka, temperature control, and Kalka–Drava–Taila ratios, while bioactive compounds such as cardenolides, flavonoids, and triterpenoids contribute to its pharmacological effects. Physicochemical studies support its suitability for topical use, but variations highlight the need for standardized quality control using HPTLC, FTIR, and GC–MS. Although *C. gigantea* extracts show significant biological activity, studies specifically on Arka Taila remain limited, indicating the need for further preclinical and clinical research.^[23,24]

15. CONCLUSION

Arka Taila, a classical Ayurvedic oil made from *Calotropis gigantea*, shows promising therapeutic potential supported by traditional use and emerging scientific findings. Its efficacy depends on proper Sneha Paka, accurate Kalka–Drava–Taila ratios, and controlled heating, while phytochemicals like calotropin, cardenolides, flavonoids, and triterpenoids contribute to its anti-inflammatory, analgesic, antimicrobial, and wound-healing effects.

Although initial studies report suitable physicochemical properties and beneficial pharmacological actions, scientific evidence on Arka Taila is still limited. Standardized formulation methods, validated analytical markers, and well-designed preclinical and clinical studies are needed. Modern techniques such as HPTLC, GC–MS, nanoformulations, and advanced delivery systems may further enhance its stability, effectiveness, and clinical utility.

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