



“ROLE OF ARKA, SWARASA, AND KALKA IN SAMHITA PHARMACEUTICS: A COMPREHENSIVE REVIEW”

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FUNDING INFORMATION:

Not Applicable

How to cite this article:

Jalpa Gandhi, “Role of Arka, Swarasa, and Kalka in Samhita Pharmaceutics: A Comprehensive Review” Asian Journal of Ayurveda Siddhant. 2025;2(3):52-56.

ABSTRACT

Introduction: Ayurvedic pharmaceutics (Bhaishajya Kalpana) forms the backbone of therapeutic applications in classical medicine. Among various dosage forms, Arka (distillate preparations), Swarasa (fresh juice), and Kalka (herbal paste) hold unique importance due to their immediate applicability, potency, and therapeutic diversity. Their systematic mention in Samhitas, including *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*, demonstrates their pivotal role in treatment strategies. **Methods:** A comprehensive review was conducted by analyzing Ayurvedic classical texts, commentaries, and Nighantus, alongside modern scientific databases including PubMed, Scopus, and Web of Science. Studies exploring pharmacological activities, standardization techniques, and clinical applications of Arka, Swarasa, and Kalka were included. Both experimental and clinical research validating traditional practices were reviewed. **Results:** Swarasa, considered the most potent among all *Pancha Kashaya Kalpanas*, is recommended for acute conditions due to its fast action. Kalka serves multiple roles—used alone as medicine, as an ingredient in formulations, and as a base for preparations like Taila and Ghrita. Arka, though emphasized later in *Rasa Shastra* texts, has its roots in Samhitas, especially for aromatic and volatile drugs, offering a pharmaceutically stable and palatable form. Modern studies reveal pharmacological potential such as antioxidant, anti-inflammatory, hepatoprotective, and antimicrobial activities, along with standardization approaches for dose consistency. **Discussion:** Comparative analysis highlights that these three forms fulfill diverse therapeutic and pharmaceutical requirements—immediacy (Swarasa), versatility (Kalka), and stability (Arka). Integrating Samhita references with modern pharmaceutical validation enhances their clinical utility in evidence-based Ayurveda.

KEYWORDS: Arka, Ayurveda, Kalka, Pharmaceutics, Swarasa

INTRODUCTION

Pharmaceutical science in Ayurveda, described under Bhaishajya Kalpana, provides structured guidelines for the preparation and use of medicines tailored to individual needs^[1-2]. Unlike modern pharmaceuticals, where synthetic formulations dominate, Ayurvedic pharmaceuticals relies on the natural potency of raw herbs and minerals, processed with precision to ensure safety and efficacy^[3-4].

Among the diverse pharmaceutical preparations, Arka (distillates), Swarasa (fresh juice), and Kalka (paste) occupy a special niche. They are considered primary dosage forms due to their direct derivation from raw materials and minimal processing^[5-6]. These preparations are extensively mentioned in Samhitas, where their indications, preparation methods, and therapeutic significance are elaborated. Their roles span acute and chronic conditions, internal and external applications, and even as intermediaries in complex formulations^[7-8].

The present review aims to systematically analyze the role of Arka, Swarasa, and Kalka as described in Samhitas, correlate their pharmaceutic and therapeutic relevance with modern research, and highlight their potential in contemporary integrative medicine^[9-10].

MATERIALS AND METHODS

A detailed literature review was conducted with the following approach:

- **Databases searched:** PubMed, Scopus, Web of Science, AYUSH Research Portal, and Google Scholar^[11].
- **Keywords used:** “Arka,” “Swarasa,” “Kalka,” “Ayurveda pharmaceuticals,” “Samhita formulations,” “Ayurvedic dosage forms.”^[12]
- **Classical sources:** *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Sharangadhara Samhita*, and relevant Nighantus^[13].
- **Inclusion criteria:** Studies (classical and modern) focusing on preparation methods, therapeutic indications, pharmacological activities, and clinical relevance of Arka, Swarasa, and Kalka^[14].
- **Exclusion criteria:** Non-Ayurvedic formulations, studies lacking

pharmacological or clinical relevance, and repetitive reviews without new insights^[15].

- **Type of studies reviewed:** Textual analysis, pharmacognostic studies, pharmacological experiments, clinical trials, and standardization studies^[15].

OBSERVATION AND RESULTS

1. Classical Description of Arka, Swarasa, and Kalka in Samhitas

Ayurvedic pharmaceuticals, as documented in the Brihatrayi (Charaka, Sushruta, and Ashtanga Hridaya) and later works like *Sharngadhara Samhita* and *Bhaishajya Ratnavali*, provides meticulous detail on the preparation and application of dosage forms. Among them, Arka, Swarasa, and Kalka are foundational preparations that demonstrate both simplicity and therapeutic potency.

- **Arka (Distillate/Medicated Extract):**
Though the term *Arka* is more elaborated in medieval texts such as *Arka Prakash*, references of distillation methods can be traced back to the Samhitas, especially in *Rasashastra* practices. Arka is prepared by subjecting herbs or minerals to distillation, yielding volatile and potent fractions. This form allowed rapid therapeutic action and ease of administration in liquid form.
- **Swarasa (Fresh Juice):**
Swarasa is considered the most potent of the *panchavidha kashaya kalpana* (five primary pharmaceutical preparations: Swarasa, Kalka, Kwatha, Hima, Phanta). Charaka emphasized its use due to its high concentration of active principles, often prepared by directly expressing juice from fresh herbs. It is considered equivalent to administering the plant in its “living” state, thereby preserving maximum potency.
- **Kalka (Paste):**
Kalka, or herbal paste, represents another fundamental preparation, obtained by grinding fresh or dried drugs with water or liquids. Kalka served both as an internal preparation (often as an anupana carrier in formulations like *avaleha* or *modaka*) and external application (for lepa, pradaha, upanaha). Its semisolid form ensured higher

stability compared to Swarasa while allowing site-specific actions in topical applications.

Thus, these preparations formed the building blocks of Samhita pharmaceuticals, directly influencing therapeutic outcomes.

2. Therapeutic Applications in Classical Texts

- **Arka:**
Arka was primarily prescribed for conditions requiring fast relief and systemic effects. *Arka Prakasha* details its use in disorders like fever, digestive impairments, and respiratory conditions. Being light, quick in absorption, and palatable, Arka also ensured better compliance in patients.
- **Swarasa:**
Charaka mentions Swarasa as the foremost choice in emergencies due to its immediate bioavailability. Examples include *Tulasi Swarasa* in kasa-shwasa (respiratory disorders), *Ardra Swarasa* in agnimandya (digestive impairment), and *Nimba Swarasa* in skin disorders.
- **Kalka:**
Kalka was applied in versatile ways. For internal use, *Yashtimadhu Kalka* was advised in ulcers, while external applications such as *Jatamansi Kalka* were used in wound healing and inflammatory swellings. Sushruta also extensively mentions Kalka in formulations for fracture healing, ulcers, and Vrana Ropana (wound care).

3. Pharmaceutico-Analytical Understanding

A closer pharmaceutico-analytical perspective reveals significant features:

- **Arka:** Extraction of volatile oils and water-soluble phytoconstituents indicates a process similar to modern distillation, producing formulations comparable to *hydrosols* and *essential oils*. These show rapid pharmacokinetics due to volatile fractions.
- **Swarasa:** As an aqueous extract prepared without heating, Swarasa preserves heat-labile phytochemicals, enzymes, and glycosides. This correlates with cold-pressed extracts in modern herbal pharmaceuticals, known for higher biological activity.

- **Kalka:** The grinding process ruptures plant cell walls, releasing intracellular contents. This is akin to semi-solid dosage forms in pharmaceuticals, ensuring localized delivery and sustained release when applied externally.

4. Comparative Insights with Modern Pharmaceutics

- **Arka vs. Distillates/Essential Oils:** Modern aromatherapy and herbal distillates mirror the Ayurvedic Arka. Both retain volatile principles with therapeutic roles in antimicrobial, digestive, and neuropsychiatric conditions.
- **Swarasa vs. Fresh Herbal Juices/Cold Extracts:** Current phytopharmaceutical industries increasingly employ cold extraction techniques to retain maximum active principles. This validates the ancient Ayurvedic practice of administering fresh juice for potency.
- **Kalka vs. Poultices and Pastes:** Kalka parallels modern poultices and topical semi-solid dosage forms (ointments, gels). The traditional lepa and upanaha practices anticipated modern transdermal delivery systems.

5. Therapeutic Efficacy and Clinical Utility

Numerous Ayurvedic formulations combine these dosage forms with adjuvants to enhance efficacy:

- **Swarasa:** In formulations like *Brahmi Swarasa* for Medhya Rasayana (cognitive enhancement), its efficacy is validated by modern studies on Brahmi's nootropic effects.
- **Kalka:** Evidence of *Neem Kalka* in wound care aligns with modern antimicrobial studies on *Azadirachta indica*.
- **Arka:** *Ajwain Arka* and *Tulasi Arka* are still used in Ayurveda pharmacies, with modern pharmacological evidence confirming antimicrobial and carminative properties.

6. Case Studies and Traditional Practices

- **Clinical Case Reports in Samhitas:** Charaka describes the immediate efficacy of Ardra Swarasa in stimulating agni (digestive fire). Sushruta highlights Kalka in fracture healing (*bhagna chikitsa*), prescribing pastes of herbs like *Laksha* and *Shallaki*.

- Modern Clinical Observations: Small-scale studies have tested formulations like *Tulasi Arka* in respiratory infections, showing symptomatic relief. Similarly, *Aloe vera Swarasa* has been explored for gastrointestinal and dermatological benefits. Topical pastes like turmeric Kalka for wound healing are widely studied and used.

7. Safety, Stability, and Standardization Issues

- Swarasa is highly perishable, necessitating immediate use. This raises challenges for large-scale clinical application and standardization.
- Arka offers better shelf life, but variation in distillation methods can alter active principle concentration.
- Kalka requires hygienic preparation and appropriate application, as contamination risk is high.

Modern standardization techniques such as HPLC, GC-MS, and stability testing are being employed to validate these formulations.

8. Integration into Contemporary Healthcare

These dosage forms, when standardized, could bridge gaps between traditional practices and modern evidence-based medicine. Current integrative approaches in Ayurveda hospitals often use Swarasa and Kalka preparations for acute conditions, while Arka formulations are available in commercial pharmacies.

Additionally, incorporation of Good Manufacturing Practices (GMP), quality control, and analytical profiling has the potential to revive these formulations for global use.

DISCUSSION

The triad of Swarasa, Kalka, and Arka highlights the pharmaceutical ingenuity of Samhita authors. Their development reflects an understanding of extraction, preservation, and targeted drug delivery much before the evolution of modern pharmaceuticals^[16].

From a modern lens:^[17]

- Swarasa mirrors fresh plant extracts used in phytotherapy, offering immediate pharmacological benefits.
- Kalka resembles herbal ointments and suspensions, ensuring sustained release and local action.

- Arka parallels distillates and essential oils, known for their stability and concentrated bioactive principles.

Despite their strong foundations, certain gaps exist. Standardization of Swarasa remains challenging due to variability in raw materials and shelf-life limitations. Kalka, though versatile, lacks widespread industrial adaptation, largely restricted to traditional practices. Arka, on the other hand, has potential for broader application in the herbal drug industry but requires rigorous validation in terms of dose-response and safety profiles^[18-19].

Future prospects lie in integrating Samhita pharmaceuticals with modern research—developing standardized extracts, validating pharmacokinetics, and exploring novel delivery systems (e.g., nano-formulations of Swarasa, transdermal Kalka, and essential oil-based Arka)^[20].

CONCLUSION

Arka, Swarasa, and Kalka embody the pharmaceutical wisdom of Ayurveda, reflecting precision in drug preparation, versatility in application, and therapeutic effectiveness. Swarasa offers immediate and potent action, Kalka provides multipurpose utility in both internal and external therapies, and Arka ensures stability and palatability of volatile principles. Collectively, they represent a pharmaceutical continuum that spans immediacy, sustainability, and modernization.

Modern scientific validation reinforces their pharmacological potential, though challenges remain in standardization, preservation, and clinical adaptation. Bridging these classical preparations with evidence-based research offers a promising pathway for integrative medicine. With strategic advancements, these formulations can significantly contribute to global herbal pharmaceuticals, ensuring that ancient wisdom continues to benefit modern healthcare.

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