

Review Article



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“COMPARATIVE REVIEW ON *KASHAYAM* (DECOCTIONS) AND EXTRACTION-BASED PHARMACOLOGY”

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ABSTRACT

Introduction: Ayurveda, the traditional Indian system of medicine, emphasizes the therapeutic use of polyherbal formulations, with *Kashayam* (decoctions) being one of the most widely prescribed dosage forms. Decoctions involve aqueous extraction through boiling, which is believed to preserve bioactive phytoconstituents in a synergistic manner. In modern pharmacology, solvent extraction methods such as ethanol, methanol, chloroform, and hydroalcoholic extractions are used to isolate bioactive compounds with high specificity. A comparative understanding of *Kashayam* preparation and modern extraction-based pharmacology offers opportunities to bridge traditional wisdom with contemporary science.

Methods: A comprehensive literature search was conducted in PubMed, Scopus, Web of Science, AYUSH Research Portal, and classical Ayurvedic texts including *Charaka Samhita* and *Sushruta Samhita*. Studies were included if they examined Ayurvedic decoctions, aqueous extracts, or solvent-based extractions with pharmacological evaluations. Both preclinical and clinical reports were considered, while studies lacking pharmacological or analytical data were excluded. **Results:** *Kashayam* preparations exhibit a broad pharmacological spectrum, including anti-inflammatory, immunomodulatory, and metabolic regulatory actions, attributed to water-soluble phytochemicals such as tannins, flavonoids, alkaloids, and glycosides. In contrast, solvent-based extractions often yield concentrated fractions of lipophilic compounds like terpenoids and sterols, showing potent activity in experimental models. Comparative analyses reveal that while *Kashayam* ensures holistic synergy and safety through traditional methods, modern extraction provides mechanistic clarity, higher reproducibility, and targeted bioactivity. **Discussion:** This review highlights the convergence and divergence of traditional decoction-based formulations and modern pharmacological extraction techniques. Integrating the holistic safety of *Kashayam* with the precision of modern extraction may pave the way for standardized, evidence-based herbal medicines.

KEYWORDS: Ayurveda, decoction, extraction, *Kashayam*, pharmacology



INTRODUCTION

Ayurveda, one of the world's oldest systems of medicine, emphasizes preventive and therapeutic approaches through dietary, lifestyle, and herbal interventions.^[1] Among its diverse dosage forms, *Kashayam* (herbal decoction) occupies a central place due to its ease of preparation, rapid assimilation, and therapeutic versatility.^[2-3]

Classical texts, including *Charaka Samhita* and *Ashtanga Hridaya*, describe numerous *Kashayam* formulations prescribed for systemic disorders such as fever, digestive ailments, inflammatory conditions, and respiratory illnesses.^[4]

In modern pharmacognosy, extraction techniques such as hydroalcoholic, methanolic, or ethanolic extraction are employed to isolate bioactive phytoconstituents with high efficiency.^[5-6] These methods enable researchers to identify and study active principles, elucidate mechanisms of action, and develop standardized phytopharmaceuticals. Solvent-based extraction often produces concentrated fractions, allowing precise pharmacological studies but sometimes losing the synergistic essence of whole-plant formulations.^[7-8] This review aims to provide a comparative analysis of *Kashayam* as described in Ayurveda and extraction-based pharmacology in modern science.^[9] Specifically, it seeks to highlight traditional perspectives of *Kashayam* preparation and therapeutic significance, summarize phytochemical and pharmacological evidence from both approaches, and critically evaluate their similarities, differences, and translational potential in integrative medicine.^[10]

MATERIALS AND METHODS

A structured literature review was carried out between March and August 2025. Electronic databases including PubMed, Scopus, Web of Science, and AYUSH Research Portal were searched using keywords such as “*Kashayam*,” “Ayurvedic decoction,” “aqueous extract,” “solvent extraction,” and “herbal pharmacology.” Classical Ayurvedic texts (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Bhavaprakasha Nighantu*) were reviewed for references to decoction preparation and clinical use.

Inclusion criteria:

- Studies reporting preparation or use of Ayurvedic decoctions.

- Preclinical or clinical studies evaluating decoctions or solvent-based extracts.
- Comparative pharmacological studies of aqueous vs. solvent extracts.
- Publications in English from 1980 onwards.

Exclusion criteria:

- Studies without pharmacological or phytochemical data.
- Case reports lacking experimental validation.
- Non-peer-reviewed or anecdotal evidence.

Data were categorized into (i) traditional *Kashayam* practices, (ii) phytochemistry of aqueous vs. solvent extracts, (iii) pharmacological actions, and (iv) clinical outcomes.

OBSERVATION AND RESULTS

1. Traditional Basis of *Kashayam*

Kashayam, also termed *Kwatha*, involves boiling coarse herbal powder in water until the volume is reduced to one-fourth, concentrating the active principles. This method ensures maximum solubilization of water-soluble phytoconstituents. Ayurvedic classics categorize *Kashayams* into single-drug decoctions (e.g., *Guduchi Kashayam* for fever) and polyherbal formulations (e.g., *Dashamoola Kashayam* for inflammatory disorders). They are administered fresh, usually within 12–24 hours, highlighting their dynamic, bioavailable nature.

2. Phytochemical Composition

Aqueous decoctions predominantly contain tannins, glycosides, flavonoids, alkaloids, saponins, and polysaccharides. These compounds are known for antioxidant, immunomodulatory, and anti-inflammatory activities. For instance, *Guduchi Kashayam* contains tinosporin and berberine derivatives, while *Triphala Kashayam* is rich in gallic acid, ellagic acid, and chebulinic acid. Conversely, solvent extraction methods (ethanol, methanol, chloroform) yield alkaloids, terpenoids, sterols, and lipophilic flavonoids often absent in water-based preparations.

3. Pharmacological Evidence – *Kashayam*

Numerous preclinical and clinical studies confirm the pharmacological efficacy of *Kashayam*.

- *Dashamoola Kashayam* demonstrated anti-inflammatory and analgesic effects in arthritis models.
- *Triphala Kashayam* exhibited antioxidant and gastroprotective activities.



- *Guduchi Kashayam* showed hepatoprotective and immunomodulatory effects.
- *Ayush-64 Kashayam* was clinically validated for malaria and viral fevers. Such findings validate the holistic therapeutic roles of *Kashayam* in diverse systemic conditions.

4. Pharmacological Evidence – Solvent Extracts

Modern pharmacological studies using solvent extracts reveal higher potency in targeted actions.

- Ethanolic extract of *Withania somnifera* demonstrated neuroprotective and adaptogenic effects.
- Methanolic extract of *Curcuma longa* showed strong anticancer and anti-inflammatory activity through NF-κB modulation.
- Hydroalcoholic extract of *Gymnema sylvestre* exhibited antidiabetic effects by regenerating pancreatic β -cells. These findings highlight that solvent extraction enables isolation of potent bioactive molecules, though sometimes at the cost of losing synergistic safety inherent in decoctions.

5. Comparative Analysis

A key difference lies in synergy vs. specificity. *Kashayams* preserve natural phytochemical interactions, supporting holistic healing with lower toxicity. Solvent-based extracts provide mechanistic clarity, reproducibility, and stronger pharmacological potency, facilitating drug discovery.

Another distinction is stability: *Kashayams* have short shelf-life, requiring fresh preparation, while solvent extracts can be standardized and stored for long durations. However, *Kashayams* align better with traditional Ayurvedic philosophy, where freshness, dynamic energetics, and polyherbal synergy are emphasized.

6. Clinical Relevance

Clinically, *Kashayams* are prescribed for systemic disorders such as respiratory infections, metabolic diseases, and inflammatory conditions. They are generally well tolerated with minimal side effects. On the other hand, solvent-based extracts are often used in nutraceuticals and phytopharmaceuticals, showing promising outcomes in chronic diseases such as diabetes, cancer, and cardiovascular

disorders.

DISCUSSION

The comparative evaluation of *Kashayam* and solvent-based extraction reveals both convergence and divergence. *Kashayams* represent Ayurveda's holistic vision—balancing *Doshas* through synergistic formulations. Their water-based preparation extracts polar phytochemicals with safety and broad-spectrum efficacy. Modern extraction, in contrast, emphasizes reductionist approaches, isolating compounds for targeted therapeutic use.^[16]

Pharmacological findings demonstrate that both systems are valid but serve different purposes. *Kashayams* are more suited for integrative, long-term management of chronic conditions due to their holistic and safe nature. Solvent extracts, however, provide high potency and are valuable in identifying lead molecules for drug development.^[17]

The major gap lies in standardization and clinical validation. *Kashayams* often lack uniform preparation standards across regions and practitioners, while solvent extracts risk ignoring synergistic principles. Bridging this gap requires interdisciplinary research—standardizing *Kashayam* preparation with modern analytical tools (HPTLC, LC-MS, metabolomics) while also investigating synergistic pharmacodynamics.^[18]

Future directions include:^[19]

- Developing standardized protocols for *Kashayam* preparation.
- Comparative metabolomic profiling of aqueous vs. solvent extracts.
- Clinical trials evaluating efficacy and safety in large populations.
- Integrating the holistic safety of *Kashayam* with the mechanistic precision of extraction-based pharmacology.

Such integration will pave the way for evidence-based Ayurveda, ensuring global acceptance and translational application in modern medicine.^[20]

CONCLUSION

Kashayam (decoctions) are an essential Ayurvedic dosage form with centuries of clinical application, offering safe, synergistic, and holistic benefits. Their aqueous extraction captures polar phytochemicals, providing broad therapeutic efficacy with minimal toxicity. In contrast, modern solvent-based extraction methods yield concentrated and lipophilic



compounds, enabling targeted pharmacological studies, mechanistic clarity, and drug development potential.

While *Kashayams* align closely with Ayurvedic principles of freshness, synergy, and dynamic energetics, solvent extracts support modern requirements for reproducibility, stability, and potency. The apparent dichotomy between traditional decoctions and extraction-based pharmacology can be harmonized through integrative research approaches. Standardization, clinical validation, and advanced analytical methods are key to bridging the gap.

In conclusion, *Kashayams* and solvent-based extracts are not mutually exclusive but complementary. By integrating Ayurvedic wisdom with modern pharmacological science, future research can develop standardized, evidence-based herbal medicines that combine safety, efficacy, and scientific rigor, ensuring their relevance in contemporary global healthcare.

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