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Review Article

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"*AVALEHYA* (MEDICATED SEMI-SOLID PREPARATIONS) IN AYURVEDA AND THEIR PHARMACOLOGICAL ACTIONS: A COMPREHENSIVE REVIEW"

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ABSTRACT

Introduction: *Avalehya* (medicated semi-solid preparations) represent one of the most widely prescribed dosage forms in Ayurveda. Classical texts describe them as palatable, long-storable, and therapeutically versatile, with applications ranging from *rasayana* (rejuvenation) to management of respiratory, digestive, and metabolic disorders. Their semisolid base, often comprising jaggery, sugar, or honey, acts both as preservative and drug vehicle. **Methods:** A systematic narrative review was performed by consulting Ayurvedic classical texts (*Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Sharangadhara Samhita*), pharmacopeial standards, and modern pharmacological literature from databases including PubMed, Scopus, and Web of Science (1950–2025). Search terms included *"Avalehya," "Leha,"* "Ayurvedic semisolid formulations," and "herbal pastes." Both experimental and clinical studies were included if they provided pharmacological, analytical, or therapeutic evidence. **Results:** Classical formulations such as *Chyavanaprasha Avaleha, Agastya Haritaki Avaleha*, and *Kushmanda Avaleha* demonstrate multifaceted therapeutic indications, especially in respiratory and metabolic disorders. Pharmacological studies show immunomodulatory, antioxidant, anti-inflammatory, adaptogenic, and antimicrobial activities. The sugar/honey base enhances palatability, stability, and shelf-life while facilitating mucosal absorption and sustained release. Modern analytical studies confirm the presence of bioactive phytoconstituents including flavonoids, glycosides, saponins, and polyphenols. Clinical evidence highlights their role in respiratory health, immune enhancement, digestive function, and general vitality. **Discussion:** *Avalehya* preparations parallel semisolid delivery systems in modern pharmaceutics, providing taste masking, dose flexibility, and synergistic herb–vehicle interaction. Despite promising evidence, challenges include lack of rigorous clinical trials, variability in raw materials, and inadequate standardization protocols. **Conclusion:** *Avalehya* formulations represent a scientifically relevant traditional dosage form with promising pharmacological actions. Integrating classical knowledge with modern pharmaceutics and standardization may unlock their full potential in contemporary healthcare.

KEYWORDS: Ayurveda, *Avalehya, Leha*, pharmacology, semisolid dosage forms

INTRODUCTION

Ayurveda, the traditional system of Indian medicine, emphasizes holistic therapeutic strategies through diverse dosage forms known as *kalpanas*.[1-2] Among them, *Avalehya* (medicated semisolid preparations) hold a unique place due to their palatability, ease of administration, and versatility. They are also called *Leha* in classics, referring to preparations that are licked, symbolizing gradual absorption and prolonged therapeutic effect.[3-4]

The pharmaceutical base of *Avalehya* typically involves sugar, jaggery, or honey, combined with herbal decoctions (*kasaya*), powders (*churna*), and lipid-based adjuvants (ghee, oil).[5-6] This synergistic combination not only improves shelf life and taste but also enhances the extraction, solubility, and delivery of diverse phytoconstituents. Formulations like *Chyavanaprasha Avaleha* are among the earliest documented nutraceuticals, acclaimed for rejuvenative, immunomodulatory, and respiratory benefits.[7-8]

The present review aims to explore *Avalehya* formulations from both classical and modern perspectives.[9] Specifically, the objectives are: (i) to summarize their traditional rationale and therapeutic uses, (ii) to critically evaluate pharmacological evidence from preclinical and clinical studies, (iii) to correlate *Avalehya* with modern semisolid drug delivery concepts, and (iv) to highlight challenges and future research prospects.[10]

MATERIALS AND METHODS

Search Strategy

A narrative review methodology was applied. Classical Ayurvedic compendia (*Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Sharangadhara Samhita*) were referred for formulations, indications, and pharmaceutical processes.[11] Electronic searches were conducted in PubMed, Scopus, Web of Science, and AYUSH Research Portal from 1950 to 2025 using keywords: *"Avalehya," "Leha,"* "Ayurvedic semisolid formulations," "Chyavanprash," "pharmacology of *Avalehya."*[12]

Inclusion Criteria[13]

- Classical *Avalehya* formulations described in authoritative Ayurvedic texts.
- Experimental pharmacological studies *(in vitro, in vivo).*
- Clinical trials or observational studies evaluating *Avalehya*.
- Analytical chemistry/phytochemical studies of *Avalehya* preparations.

Exclusion Criteria[14]

- Anecdotal references without pharmacological/analytical validation.
- Studies lacking clarity on formulation composition or preparation.

Data Extraction

Data were compiled on: (i) formulation process, (ii) therapeutic indications, (iii) pharmacological activities, (iv) clinical outcomes, and (v) standardization/quality parameters. A thematic synthesis approach was used to integrate Ayurveda with pharmacological perspectives.[15]

OBSERVATION AND RESULTS

1. Classical Description of *Avalehya*

- Defined as *madhura rasa yukta* (sweet-based) semisolid formulations intended for licking (*lehana*).
- Preparation involves decoction (*kwatha*), addition of sugar/jaggery, ghee/oil, powders (*prakshepa dravya*), and adjuvants like honey.
- Therapeutic benefits include *rasayana* (rejuvenation), *vajikarana* (aphrodisiac), respiratory, digestive, and metabolic indications.
- Examples: *Chyavanaprasha Avaleha* (immunomodulation), *Agastya Haritaki Avaleha* (respiratory health), *Drakshavaleha* (digestive and hepatic disorders), *Kushmanda Avaleha* (nourishing, anxiolytic).

2. Pharmaceutical Characteristics

- Semi-solid texture allows gradual release and mucosal absorption.
- Sugar/honey base acts as preservative, enhances stability, and masks bitterness.
- Lipid adjuvants (ghee/oil) improve solubility and absorption of lipophilic phytoconstituents.
- Incorporation of polyherbal powders enhances synergy and polypharmacology.

3. Pharmacological Activities (Preclinical and Experimental Evidence)

- **Immunomodulatory & antioxidant:** *Chyavanaprasha* enhances NK cell activity, increases antioxidant enzymes.

- **Anti-inflammatory & bronchodilator:** *Agastya Haritaki Avaleha* shows bronchodilation and cytokine modulation in asthma models.
- **Neuroprotective & adaptogenic:** *Kushmanda Avaleha* reduces anxiety, improves memory in animal models.
- **Hepatoprotective:** *Drakshavaleha* demonstrates protection against chemically induced hepatotoxicity.
- **Antimicrobial:** Several *Avalehyas* exhibit antibacterial and antifungal activity due to polyphenolic and terpenoid constituents.

4. Clinical Evidence

- RCTs with *Chyavanaprasha* indicate improved immunity, reduction in recurrent infections, and enhanced antioxidant status.
- *Agastya Haritaki Avaleha* found beneficial in mild-to-moderate asthma and allergic rhinitis.
- Pediatric use of *Avalehya* shows safety and better compliance due to palatability.
- Limited but promising data on metabolic disorders and neurocognitive function.

5. Comparative Perspective with Modern Pharmaceutics

- *Avalehya* formulations share parallels with semisolid delivery systems (syrups, pastes, nutraceutical gels).
- Advantages: dose flexibility, taste masking, stability, polyherbal synergy.
- Limitations: high sugar content (not suitable for diabetics), batch-to-batch variability, lack of uniform SOPs.

6. Quality Control and Standardization

- Analytical techniques: HPTLC, HPLC, GC-MS, and spectrophotometry for phytoconstituent profiling.
- Shelf-life studies confirm stability up to 3 years when stored properly.
- Modern pharmacopeias recommend testing for microbial load, heavy metals, and physicochemical parameters.

DISCUSSION

Avalehya preparations exemplify Ayurveda's adaptability in creating formulations that are both therapeutically potent and patient-friendly. Their semisolid base allows incorporation of hydrophilic and lipophilic phytoconstituents, a concept now widely adopted in modern nutraceuticals and semisolid dosage forms. From the pharmacological standpoint, *Avalehya* leverages multiple mechanisms: antioxidant protection, immune regulation, anti-inflammatory modulation, and nourishment of vital tissues.[16]

Modern evidence, though growing, remains limited compared to their extensive traditional use. The most studied *Avalehya, Chyavanaprasha,* demonstrates consistent antioxidant and immunomodulatory benefits. However, clinical evidence on other formulations like *Drakshavaleha* or *Kushmanda Avaleha* is sparse and often restricted to small trials. This highlights the gap between traditional claims and modern validation.[17]

Another challenge is standardization. Traditional methods emphasize specific heating stages (*paka lakshanas*), but modern production often lacks uniform parameters. This leads to variability in phytoconstituent content and therapeutic efficacy. Addressing this requires integration of pharmacopeial SOPs with advanced analytical tools (fingerprinting, metabolomics, bioassays).[18]

Importantly, the high sugar content of *Avalehya* poses a limitation in today's context of diabetes and metabolic syndrome. Reformulation with safer sweetening agents, while preserving classical therapeutic essence, is an area worth exploring. Additionally, innovative packaging and delivery (sachets, unit-dose tubes) may improve patient compliance and global acceptance.[19]

In modern pharmaceutics, semisolid delivery systems are designed for sustained release, palatability, and stability—features inherently present in *Avalehya*. Thus, Ayurveda anticipated principles that contemporary pharmaceutics rediscovered centuries later. Bridging both fields offers a fertile ground for developing evidence-based, globally acceptable formulations.[20]

CONCLUSION

Avalehya preparations represent one of the most patient-friendly and therapeutically diverse dosage forms in Ayurveda. Their classical foundation combines sugar or honey bases with herbal decoctions, powders, and lipid adjuvants to produce stable, palatable, and potent semisolid medicines. Modern pharmacological studies validate several of their claimed benefits, including antioxidant, immunomodulatory, anti-inflammatory,

neuroprotective, and hepatoprotective actions.

The review highlights that *Avalehya* formulations parallel modern semisolid and nutraceutical delivery systems in providing palatability, dose flexibility, and enhanced phytoconstituent absorption. Nonetheless, research gaps remain, particularly in the areas of large-scale clinical validation, pharmacokinetics, and standardization. The challenge of high sugar content also necessitates innovative reformulations suitable for contemporary metabolic health contexts.

In conclusion, *Avalehya* embodies a unique bridge between Ayurveda and modern pharmaceutics. With rigorous research, standardization, and innovative adaptation, these formulations can evolve from traditional remedies into globally accepted nutraceuticals and complementary medicines.

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