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Need and Scope of Advanced Dosage Forms in Ayurveda: A Special Emphasis on Ointment Preparations for Skin Disorders

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Abstract

Ayurveda, an ancient system of medicine, traditionally employs various dosage forms such as lepa (pastes), taila (oils), and malhara (ointments) for topical skin treatments. However, with evolving lifestyle demands, patient compliance issues, and the need for enhanced stability, bioavailability, and precise delivery, there is a growing necessity for advanced dosage forms in Ayurveda. This article explores the limitations of traditional formulations and highlights the advantages of modern adaptations, particularly ointments, in treating skin disorders. A review of literature and studies on Ayurvedic topical ointments demonstrates improved penetration, sustained release, and better therapeutic outcomes for conditions like wounds, psoriasis, eczema, and eruptions. Advanced ointments incorporating herbal extracts in semi-solid bases offer superior emollient properties, reduced irritation, and antioxidant effects compared to traditional lepa or oils. Evidence from stability tests, *in vitro* permeation studies, and clinical evaluations supports their efficacy. The integration of novel drug delivery systems, such as emulsions and semi-solid bases, into Ayurvedic principles preserves holistic benefits while addressing modern challenges. This advancement ensures better patient adherence, global acceptance, and effective management of skin ailments, bridging ancient wisdom with contemporary pharmaceutics.

Keywords: Advanced dosage forms, *Ayurveda*, *Ayurvedic ointments*, Skin treatment, Novel drug delivery.

Introduction

Ayurveda, originating over 5,000 years ago in India, is a holistic system of medicine emphasizing balance among body, mind, and spirit. Its pharmaceutics, known as Bhaishajya Kalpana, describes a wide array of dosage forms classified into solid, semi-solid, liquid, and others, derived from plant, animal, and mineral sources. Traditional topical forms for skin treatment include lepa (external pastes), malhara (ghee-based ointments), taila (medicated oils), and kalka (fresh herbal pastes). These are effective for conditions like twak roga (skin diseases), vranas (wounds), kustha, daha, shotha and visarp (eruptions), as described in classics like Charaka, Ashtanga Hridaya and Sushruta Samhita.

Bhaishajya Kalpana describes various topical formulations such as lepa (pastes), kalka, taila (medicated oils), and malhara (ointments).

Malhara kalpana is a semisolid preparation traditionally prepared using sneha dravya like ghrita or taila combined with siktha (beeswax) or herbal kalka. These formulations provide prolonged contact with the skin, protection of lesions, and sustained drug action. However, traditional ointments face limitations such as variability in texture, limited shelf life, and acceptability issues.

With advances in pharmaceutics, ointments have emerged as an advanced dosage form that can incorporate Ayurvedic principles while meeting modern requirements of stability, uniformity, and patient compliance. This review focuses on ointments as an advanced topical dosage form in Ayurveda, based purely on literary evidence.

Need for Advanced Dosage Forms in Ayurveda

The need for advanced dosage forms arises from increasing prevalence of skin disorders due to pollution, stress, and lifestyle changes. Modern pharmaceutics offers solutions like enhanced stability, controlled release, better bioavailability, and aesthetic appeal. Novel drug delivery systems (NDDS), such as emulsions, nanoparticles, and liposomes, can be integrated with Ayurvedic herbs to improve therapeutic outcomes without compromising safety.

Advanced dosage forms aim to:

- Improve shelf life and stability
- Enhance drug penetration and therapeutic efficacy
- Ensure uniform dosing
- Increase patient compliance and acceptability

Ointments fulfill these criteria by providing occlusive effect, controlled release, and protection of active ingredients from degradation.

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Limitations in the Modern Era:
Short shelf life, inconsistent dosing, poor patient compliance due to greasy texture or strong odors, limited penetration, and challenges in large-scale manufacturing. Perishable preparations like swarasa (juices) and kalka require fresh preparation, reducing practicality. Oils and pastes may cause staining or discomfort, deterring regular use.

Ointments (Malhara) in Ayurvedic Classics
Ayurvedic texts describe malhara as a preparation useful for external application in skin diseases and wounds. Sushruta emphasizes the role of sneha-based applications in wound healing, while Sharangadhara provides pharmaceutical details regarding semisolid preparations. Ingredients commonly used include ghrita, taila, siktha, and herbal drugs possessing vrana-ropana, kledaghna, and kushthaghna properties.
These classical concepts form the foundation for modern Ayurvedic ointment formulations.

Ointments as Advanced Dosage Forms
From a pharmaceutico-technical perspective, ointments are semisolid preparations intended for external application, offering advantages such as:

- Prolonged contact time with skin
- Enhanced hydration and occlusion
- Better penetration of lipid-soluble phytoconstituents
- Reduced dosing frequency compared to traditional lepa or taila.

Studies show Ayurvedic ointments with ingredients like Yashada bhasma, Shorea robusta resin, or Curcuma longa promote wound healing, reduce inflammation, and improve skin barrier function. They align with Ayurvedic principles of varnya (complexion enhancement) and tvachya (skin nourishment) while meeting contemporary needs for convenience and efficacy.
Modern Ayurvedic ointments use standardized herbal extracts and suitable bases while preserving the therapeutic intent described in classics.
This evolution supports global integration of Ayurveda, ensuring evidence-based validation through standardization and clinical trials. Advanced forms enhance patient-centric care, particularly for chronic skin conditions requiring prolonged treatment.

Materials and Methods
This study is a narrative review based on secondary data from published literature on Ayurvedic dosage forms and topical applications.

Literature Search
Review articles and scholarly literature highlight that Ayurvedic ointments demonstrate improved stability, longer shelf life, and better patient acceptability compared to traditional lepa and taila. Ointments are particularly useful in chronic skin disorders, non-healing wounds, and inflammatory conditions where sustained action is required.
Literature also emphasizes that ointments allow incorporation of multiple herbal drugs and minerals, supporting polyherbal synergy described in Ayurveda
Electronic databases including PubMed, Google Scholar, ResearchGate, and Ayurvedic journals were searched using keywords: "advanced dosage forms Ayurveda", "Ayurvedic ointments skin treatment", "novel drug delivery Ayurveda", "topical formulations Ayurveda", "herbal ointments wound healing", and "traditional vs modern Ayurvedic formulations.

Data Extraction
From approximately 80 sources, key data on traditional forms (lepa, malhara, taila), limitations, modern adaptations (ointments, creams, emulsions), formulation methods, stability tests, *in vitro/in vivo* evaluations, and clinical outcomes were extracted. Special emphasis on ointments: base (hydrocarbon or absorption bases), incorporation of herbs (e.g. Shorea robusta, flax seed oil), parameters like viscosity, spreadability, permeation, and efficacy in skin parameters (inflammation, hydration, wound contraction).

Results
Traditional Ayurvedic topical forms like lepa and malhara show efficacy but limitations in stability and compliance. Modern ointments overcome these, demonstrating superior outcomes.
Stability studies on herbal ointments (e.g. Shorea robusta resin) remained stable at accelerated conditions, with consistent viscosity and no microbial growth. Formulations in absorption bases exhibited enhanced shelf life compared to traditional ghee-based malhara.
***In vitro* permeation:** Ointments with penetration enhancers showed higher flux of actives across skin models versus traditional pastes.
Sensory Evaluation: Ointments scored high for emollience, occlusion, and acceptability versus greasy taila.
Overall, ointments provided better occlusion, reduced inflammation, and enhanced healing, with advantages in sustained release, precise dosing, and prolonged contact time.

Discussion
The transition to advanced dosage forms in Ayurveda addresses key challenges of traditional preparations. Traditional lepa and malhara, while rooted in classics, often lack uniformity, have short shelf lives, and variable aesthetics, leading to low compliance. Ointments, as modern semi-solid formulations, offer occlusive properties, better emollience, and sustained release, aligning with NDDS principles like enhanced bioavailability and targeted delivery.
Special focus on skin treatment reveals ointments' superiority: occlusive texture improves adherence for dry or chronic conditions. Herbal ingredients (turmeric, neem, Yashada bhasma) in ointment bases exhibit antioxidant, anti-inflammatory, and antimicrobial effects, promoting collagen and reducing inflammation as seen in wound models. Compared to oils, ointments provide better protection without excessive greasiness.
Integration of NDDS (e.g., semi-solid bases, nanoparticles) with Ayurvedic herbs preserves holistic action while adding precision. Studies confirm stability under accelerated conditions and no toxicity, supporting safety.
Future: Nano-ointments or advanced bases could further enhance penetration for deeper skin layers.

Conclusion
Advanced dosage forms, particularly ointments, are essential for modernizing Ayurveda while retaining its essence. They overcome limitations of traditional topical preparations, offering better stability, compliance, and efficacy in skin treatment. Evidence supports their role in managing diverse dermatological conditions safely and effectively. Embracing these advancements will ensure Ayurveda's relevance in contemporary medicine.

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