

**ROLE OF DRAVYA (LIQUID MEDIA) IN LEPA KALPANA: A
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ABSTRACT

Lepa Kalpana is an important form of external therapy (Bahiparimarjana Chikitsa) in Ayurveda and is commonly used in skin, inflammatory, and musculoskeletal disorders. In this preparation, herbal or herbo-mineral powders are mixed and triturated with a suitable liquid medium (Dravya) to form a paste for application on the skin. The choice of Dravya may influence the preparation's consistency, contact time, drug dispersion, and delivery of active constituents to the skin. Classical Ayurvedic texts describe several media, including Goghrita, Taila, Godugdha, Dadhi, Takra, Gomutra, Gopitta, Madhu, Kanji, Jala, and Kwatha. Each medium has specific Ayurvedic properties and traditional indications. Modern pharmaceutical principles also show that topical drug absorption depends on factors such as drug solubility, skin hydration, interaction with the stratum corneum, lipid structure, and thermodynamic activity. This review discusses the

traditional role of commonly used Dravya in Lepa Kalpana and relates these properties to possible mechanisms of topical drug delivery. Lipid-rich media may support delivery of lipid-soluble constituents, aqueous and amphiphilic media may improve hydration and

dispersion, while acidic or other specialized media may modify the skin environment and drug availability. Understanding the role of Dravya may help in the rational development, standardization, and evaluation of Ayurvedic topical formulations.

KEYWORDS: Lepa Kalpana, Dravya, skin absorption, topical drug delivery, stratum corneum, Ayurvedic pharmaceuticals.

INTRODUCTION

Lepa Kalpana is a therapeutic paste applied externally to the body and is an important part of Bahiparimarjana Chikitsa in Ayurveda. Although the medicinal powder is an important component of the formulation, the liquid medium used during trituration also contributes to the characteristics and possible therapeutic performance.^[1]

The Dravya acts as a vehicle for the medicinal ingredients. It helps in mixing and spreading the drug and maintains contact between the formulation and the skin. The selected medium may also influence the solubility, dispersion, release, and penetration of active constituents.^[2]

Ayurvedic texts describe several media, including Jala (water), Godugdha (milk), Goghrita (ghee), Taila (oil), Takra (buttermilk), Kanji (fermented sour liquid), Gomutra (cow urine), Gopitta (cow bile), Madhu (honey), Dadhi (curd), and herbal decoctions (Kwatha).^[1-4]

The selection of a particular medium depends on the Dosha involved, disease condition, stage of the disease, and site of application.^[1,2] Cooling and unctuous media such as milk and ghee are traditionally used in conditions associated with burning and Pitta predominance.^[1,2,7] Sour and heating media such as Kanji and Takra are used in conditions associated with Kapha, swelling, and thick or indurated lesions.^[3,4]

From a pharmaceutical perspective, the vehicle can affect topical drug delivery by changing drug solubility, thermodynamic activity, skin hydration, and permeability.^[5,6] Lipid-rich vehicles can interact with the lipid components of the stratum corneum, while acidic or fermented media may influence the release and availability of some plant constituents.^[5,6]

Therefore, the selection of Dravya in Lepa Kalpana can be considered an important part of formulation design and not simply a method for converting medicinal powders into a paste.

CLASSIFICATION AND TRADITIONAL USES OF DRAVYA

The major media reviewed in this article and their classical applications are presented in Table: 1^[1,3,7-10]

Sl. No.	Dravya	Classical Lepa formulations	Traditional indications	Classical source
1	Goghrita (Ghee)	Dashanga Lepa, Shuktyadi Lepa	Inflammatory swelling, Kushtha, burning ulcers	Sharangadhara Samhita ^[3] , Gadanigraha ^[9]
2	Godugdha (Milk)	Pittaja Vidradhihara Lepa, Romotpadaka Lepa	Pitta abscess, burning, alopecia	Sharangadhara Samhita ^[3]
3	Dadhi (Curd)	Vyangahara Lepa, Gandamala Lepa	Hyperpigmentation, cervical lymphadenitis	Sharangadhara Samhita ^[3]
4	Gomutra (Cow urine)	Patyadi Lepa, Putikadi Lepa	Dadru, severe Kushtha, Shotha	Bhavaprakasha Nighantu ^[8] , Sushruta Samhita ^[1]
5	Gopitta (Cow bile)	Kustanashaka Lepa, Gojivhadi Lepa, Vachadi Lepa	Chronic Kushtha, thickened lesions, plaques	Charaka Samhita ^[7]
6	Takra (Buttermilk)	Kustadi Lepa, Aragwadadi Lepa	Exudative Kushtha, itching, Kapha-Pitta skin disorders	Charaka Samhita ^[7]
7	Taila (Oil)	Kesha Sanvardhaka Lepa, Dadrugna Lepa	Hair disorders, Dadru, chronic dryness	Sharangadhara Samhita ^[3]
8	Madhu (Honey)	Upadansha Nashaka Lepa, Daruna Lepa	Ulcers, dandruff, non-healing wounds	Sharangadhara Samhita ^[3]
9	Kanji	Balyadi Lepa, Shotahara Lepa	Inflammatory swelling, Kushtha	Yoga Ratnakara ^[10] , Sharangadhara Samhita ^[3]
10	Navaneeta (Fresh butter)	Mukhakantikara Lepa	Facial discoloration, dryness, cosmetic use	Sharangadhara Samhita ^[3]
11	Jala (Water)	Netrarogahara Lepa, Shlipadaroga Hara Lepa	Acute inflammatory eye disorders, filariasis, burns	Sharangadhara Samhita ^[3]

ROLE AND MECHANISM OF INDIVIDUAL DRAVYA

1. Goghrita (Cow Ghee)

Goghrita is described in Ayurveda as Vata-Pitta Shamaka, Vrana Ropaka, Twachya, and Rasayana. It is also associated with the concept of Samskarasya Anuvartana, by which it can

carry the properties of substances processed with it while retaining its own characteristics. It is also described as a Yogavahi vehicle that supports the action and delivery of medicinal substances.^[1,7]

From a pharmaceutical perspective, ghee contains triglycerides and saturated and unsaturated fatty acids.^[13] The stratum corneum contains a large amount of lipid material. Therefore, lipid-rich vehicles may interact with the intercellular lipids of the skin and influence the barrier properties of the stratum corneum.^[5,11]

Ghee may help in the dispersion and delivery of lipid-soluble constituents. Its occlusive nature can also reduce transepidermal water loss and increase hydration of the outer skin layer.^[5,12,13] These effects may support prolonged contact between the formulation and the skin.

2. Godugdha (Cow Milk)

Godugdha is described as Sheeta, Snigdha, Balya, Jeevaniya, and Vata-Pitta Shamaka. It is traditionally used as a medium in inflammatory and burning skin conditions.^[1,7]

Milk contains both aqueous and lipid components. The aqueous phase contains proteins, sugars, and minerals, while the lipid phase contains fat globules stabilized by proteins.^[14] Because of this mixed nature, milk can provide a medium for both water-soluble and lipid-soluble constituents.^[11,14]

When applied to the skin, the aqueous component may hydrate the stratum corneum, while the lipid component may form an emollient layer.^[5] Hydration of the stratum corneum can increase its permeability to some substances.^[12]

Milk proteins and lipids may also help reduce irritation produced by strong or Tikshna medicinal substances.

3. Dadhi (Curd/Yogurt)

Dadhi is described as Amla, Snigdha, Guru, and Balya and is considered Vata-shamaka. It may increase Kapha and Pitta.^[7]

Curd contains lactic acid formed during fermentation. Lactic acid is an alpha-hydroxy acid and has a mild keratolytic effect.^[15] It can reduce the cohesion between superficial skin cells and may modify the outer layer of the stratum corneum.^[11,15]

The aqueous and lipid components of curd may help disperse different types of active constituents.^[11,14] Its moisture content can hydrate the skin, while its consistency can maintain contact between the preparation and the skin for a longer period.^[12,15]

Thus, Dadhi may support topical drug delivery through hydration and mild modification of the outer skin barrier.

4. Gomutra (Cow Urine)

Gomutra is described as Katu and Tikta in taste, Ushna in potency, and Laghu and Tikshna in properties. It is considered Kapha-Vata Shamaka.^[7,8]

Because of its Tikshna and Sukshma properties, it is traditionally used as a medium in conditions such as Kushtha, Dadru, and Shotha.^[1,7,8]

Modern literature describes cow urine as containing urea, volatile fatty acids, phenolic compounds, and minerals.^[16,17] Urea is known to influence the stratum corneum by interacting with keratin and increasing hydration of the skin.^[5,11] These effects may facilitate the movement of some substances through the outer skin layer.

Some experimental studies have also reported antimicrobial, antioxidant, and immunomodulatory properties associated with cow urine or cow urine distillate.^[16–19] These observations may provide possible explanations for some of its traditional applications. However, the findings should be interpreted according to the specific preparation and concentration studied.

5. Gopitta (Cow Bile)

Gopitta is described as Tikta-Katu, Ushna, Tikshna, and Lekhana. It is traditionally associated with Srotoshodhaka and Yogavahi actions and is used in chronic and thickened skin conditions.^[3,7]

Bile contains bile acids and bile salts, including compounds such as cholate and deoxycholate.^[20] Bile salts can act as biological surfactants and interact with lipid structures.

Surfactants may alter the arrangement of lipids in the stratum corneum and temporarily influence skin permeability.^[5,20] This may help the movement of some poorly soluble constituents through the skin.

The proposed modern mechanism may provide a possible interpretation of the traditional descriptions of Lekhana and Srotoshodhaka action, although direct equivalence between Ayurvedic concepts and modern mechanisms cannot be assumed.

6. Takra (Buttermilk)

Takra is described as Deepana, Pachana, Kaphahara, and Lekhana. It is traditionally indicated in Kapha-Pitta skin disorders associated with itching, swelling, and exudation.^[7]

Takra is a relatively low-fat acidic emulsion containing lactic acid, milk proteins, and short-chain fatty acids.^[14] Its aqueous component can hydrate the stratum corneum, while its acidic nature may influence the skin surface environment.^[15]

The presence of lactic acid may also provide a mild keratolytic effect.^[15]

Because Takra is less oily than ghee or oil, it may be useful in some moist or exudative lesions where excessive occlusion may not be desirable.^[7,14]

7. Taila (Oil)

Taila, particularly Tila Taila, is described as Snigdha, Sukshma, Vyavayi, Vikasi, and Vatahara.^[2,7]

Plant oils contain triglycerides and fatty acids such as oleic and linoleic acid.^[24] Oleic acid can modify the organization of lipids in the stratum corneum and has been studied as a penetration enhancer.^[11,23]

The spreading properties of oils allow oil-based preparations to cover the skin effectively. They may also enter follicular openings and small surface irregularities.^[11,23]

Oil can reduce water loss from the skin and maintain hydration, which may support prolonged contact and delivery of lipid-soluble constituents.^[5,12,25]

8. Madhu (Honey)

Madhu is described as Madhura-Kashaya, Ruksha, Laghu, and Sheeta and is associated with Vranaropaka, Shedana, and Yogavahi actions.^[1-3,8]

Honey is a concentrated and viscous sugar solution.^[8] Its viscosity can help the formulation remain at the site of application and increase contact time.^[25]

Honey is also hygroscopic and can attract water. Its high osmotic pressure may help draw excess fluid from tissues, which may be relevant to local swelling.^[1]

Its ability to maintain moisture and prolonged contact may support gradual diffusion of active constituents from the formulation into the skin.^[5,12]

9. Kanji (Fermented Sour Liquid)

Kanji, also called Aranala, is an acidic fermented liquid. It is described as Amla and Ushna and is associated with Vata-Kapha balancing properties.^[3,10]

It may contain organic acids such as lactic and acetic acid and other products formed during fermentation.^[10] The acidic environment can influence the ionization and solubility of certain plant constituents.^[11]

During topical application, organic acids may alter the surface pH and soften keratin. These effects may influence the penetration of some active constituents.^[11,15]

10. Navaneeta (Fresh Butter)

Navaneeta is described as Sheeta, Snigdha, Vatapittahara, and Mukhakantikara.^[3]

It contains low-melting lipids and phospholipids. These lipids soften at body temperature and may form an emollient layer on the skin.^[3]

The lipid nature of Navaneeta may support the movement of lipid-soluble constituents into the lipid components of the epidermis.^[5] Its soft consistency may also help maintain contact with the skin.

11. Jala (Water and Herbal Decoctions)

Jala and aqueous decoctions (Kwatha) are hydrophilic media traditionally used when cooling and soothing effects are required.^[1,3]

Water can rapidly hydrate the outer layer of the skin. Hydration causes the corneocytes to swell and may temporarily influence the movement of some substances through the stratum corneum.^[5]

Evaporation of water from the skin removes heat and produces a cooling effect, which may help relieve burning and discomfort.^[1,2]

However, water-based preparations dry relatively quickly. Therefore, repeated application may be required when prolonged contact is needed.^[1,3]

BIOPHARMACEUTICAL MECHANISMS OF SKIN PENETRATION

The method of application may also influence the delivery of a Lepa. Classical practice describes application in Pratiloma Gati, or against the direction of hair growth. This may create mechanical pressure that moves paste particles toward follicular openings.^[1]

Friction during application can produce local heat. From a modern pharmaceutical perspective, temperature may influence the lipid organization of the stratum corneum and the movement of substances through the skin.^[5,23]

Local warming may also increase superficial blood flow and may contribute to local drug uptake.^[22,23]

Another important factor is the thermodynamic activity of the drug in the vehicle. A drug must be adequately available in the vehicle before it can move into the skin.^[11,25]

For example, a poorly water-soluble lipophilic substance may have limited availability when mixed only with water. In contrast, lipid-rich media such as Goghrita and Taila may provide a more suitable environment for lipid-soluble constituents. Amphiphilic media such as Godugdha, Takra, and Dadhi contain both aqueous and lipid components and may help disperse different types of constituents.^[5,11]

Trituration (Mardana) with suitable media may improve dispersion and interaction between the medicinal material and the vehicle. Some amphiphilic or surfactant-containing systems may form organized structures such as micelles or other drug-carrying structures; however, this possibility requires experimental confirmation for individual Ayurvedic formulations.^[5,11,21]

Importance of the Lepa drying stage

Classical instructions advise removing the Lepa before it becomes completely dry, referred to as the Avisosi stage.^[1,2]

As the liquid component evaporates, the concentration of the drug in the remaining formulation may temporarily increase. This can increase the driving force for diffusion.^[11,25]

After complete drying, however, the liquid interface is lost and drug movement may decrease. A completely dry preparation may also remove moisture from the skin and cause dryness or irritation.^[1,2,5]

Therefore, the appropriate consistency and duration of application are important considerations in topical drug delivery.

CONCLUSION

The selection of Dravya in Lepa Kalpana is an important part of Ayurvedic topical formulation. The liquid medium does more than convert medicinal powders into a paste. It can influence drug dispersion, contact time, skin hydration, solubility, and possible penetration.

Lipid-based media such as Goghrita and Taila may support the delivery of lipid-soluble constituents. Milk, curd, and buttermilk contain aqueous and lipid components and may provide hydration as well as vehicle-related effects. Gomutra and Gopitta contain constituents that may influence the skin environment and permeability. Madhu can increase contact time because of its viscosity, while Kanji provides an acidic medium. Jala mainly provides hydration and cooling.^[5,6,11,12]

Modern pharmaceutical concepts provide possible explanations for several of these traditional practices. These include modification of skin lipid structure, hydration of the stratum corneum, mild keratolytic effects, follicular transport, and changes in drug availability within the vehicle.

Understanding the role of Dravya may therefore help in the rational development and standardization of Ayurvedic topical formulations. However, the proposed mechanisms should be further evaluated using appropriate formulation studies, skin-permeation studies, and experimental models.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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