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# Topical route of administration & its counterpart in ayurveda

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**Abstract**
Skin is said to be outermost covering of the body, which is the outermost barrier between the human body and environment. Topical route of administration deliver drugs almost directly to the site of action, the risk of systemic side effects is reduced. Modern medicine have explained topical applications such as creams, lotions, liniments, etc. which can be w/o or o/w emulsions. In Ayurveda topical applications are mentioned under *bahirparimarjan chikitsa* and this *chikitsa* acts on respective *dosha* when applied on the skin. Whereas modern medicine has told various bases which are used in topical applications such as boric acid, menthol, glycerin etc. According to Ayurveda *pralepa, pradeha, alepa*, etc. are the classification of *lepas* and which consist of various ayurvedic drugs such as *kushta, priyangu, daruharidra*, etc. according to their *veerya*. This article explains descriptive information about topical application according to newer therapy and Ayurveda and also preparation of *lepa*.

**Keywords:** Dermatological bases, emulsions, topical applications, *bahirparimarjana chikitsa.*

## 1. Introduction
Route of administration in pharmacology is the way by which the drugs are taken into the body [1]. Route of administration are basically classifies according to the target effect of drugs such as effect is local or systemic. In topical route of drug administration drugs are applied to body surface like skin or mucous membranes [2].
Topical medications are used to treat disease in various forms like liniments, braces, lotions, ointments, creams, dusting powder, aerosols and transdermal patches [3]. Topically administered drugs can be used for local or systemic effect [4]. Topical application prevent the metabolism of drug in the liver and increases the bioavailability of the drug and also provides its effects directly on site of action [5]. Misuse of them can give rise to some complications in a patient [6].

### 1.1 Skin penetration
Once the drug is applied on the skin it gets absorbed through epidermis, glands or hair follicles and permeate through lipid bilayers of stratum corneum [7]. Before entering in dermis it must passed through the seven layers of epidermis. In dermis drugs can enter in the bloodstream and lymph.
Stratum corneum is outermost layer of epidermis [8]. Lipids are the essential components of stratum corneum. It attributes to the barrier function of skin [9]. The penetration of the drugs into the skin follows Fick's first law of diffusion [10]. According to the law, the molecule moves by random motion in the direction of lower concentration. Hence transfer rate of solutes depend upon concentration of the various ingredients, the size of the treatment surface area and the permeability of the skin.

### 1.2 Choice of base
Base is a vehicle or carrier into which active ingredients may be integrated. Effectiveness of medication is changed with its base. According to experience or practices ointment base convey active ingredients more rapidly into the skin than the solution or cream base [11].

### 1.3 Dermatological bases [12]
a. Solids- Dusting powder.
b. Liquids- Solution, emulsion, liniments, suspension, lotion, paints.
c. Semisolids- Creams, gel, ointments, paste.

In ayurveda *lepas* can be compared with topical medication and this comes under the heading *of bahirparimajana chikitsa* (intended for external use) [13]. In *Bahirparimarjana chikitsa* drugs are applied to body surface for external cleansing. Various formulations like *lepa, upanaha, malhar kalpana* were defines as *bahya kalpana* [14].

### 1.4 Absorption and activity of drugs according to Ayurveda [15-18]
It has been said in ayurveda that body is resting in *tridosha (vata, pitta, kapha)* and each of five subtypes.
*Bhrajak pitta* and *vyana vayu* subtypes of *pitta dosha* and *vata dosha* respectively are dwelling in twak (skin). But dwelling of subtype of *kapha* has not been mentioned specifically. It may be said that because of *dhatu* binding property of *shleshma, sleshaka kapha* which is present in layer of *twak*. The active ingredient in drugs which is applied on skin is said to be metabolized by *bhrjaka pitta* whereas penetration and absorption of active ingredient is done by *vyana* and *samana vayu.*
After absorption drug would act on body according to its veerya (active principles) and some time with its *prabhava* (specific potency).

## 2. Materials and Methods
Materials related to concept of topical route of administration, and other relevant topics have been collected. For Ayurvedic

and modern concepts of reference have been taken from textbooks, various websites, electronic media and articles.

### 2.1 Topical applications in Modern therapy

#### 2.1.1 Ointment

An ointment is homogenous, viscous, and greasy in nature. The vehicle of an ointment is known as ointment base in which medicaments dissolved, suspended or emulsified [19].

Generally ointments are formulated of fluid hydrocarbons meshed in a matrix of higher melting solid hydrocarbons [20]. It is good for dry skin because of moisturizing property. Irritation risk is low for ointments. Most of the patients do not like ointments because of its greasiness [21].

#### 2.1.1.1 Characters of ointment base

a. It should be inert, stable, and odorless.
b. It should be smooth and compatible.
c. It should be nonirritant.
d. It should release the medicament readily.
e. It should not delay healing process of the wound.

#### 2.1.1.2. Classification of ointment base

**a. Hydrocarbon bases**

These bases are not absorbed by skin and incompatible with water. By forming waterproof film the inhibit water loss from skin [22]. Petrolatum with 5% beeswax are typically used vehicle. They are most occlusive of topical formulations. Hence, it is advised in chronic skin disorders [23].

**b. Absorption bases**

It have two types,

1. Those that permit incorporation of aqueous solution resulting in formation of w/o emulsions.
2. Those that are already w/o emulsions and permit incorporation of additional quantity of aqueous solution.

Absorption bases are insoluble in water and they are not water washable but they can absorb water. This may be used as emollient. Absorption base typically can incorporate about 50% of their volume in water. In these bases incorporation of insoluble drugs can be done mechanically or by fusion. In the water phase of w/o emulsion we can add water soluble ingredients.

Water, glycerin, alcohol or propylene glycol can be used for incorporation of drug ingredients [24].

**c. Water removable bases**

Water removable bases are oil-in-water emulsions in which water soluble ingredients can be incorporated into the external phase, glycerin, propylene glycol, polyethylene glycol like water miscible fine agents can be preferred in case of insoluble ingredients [25]. These bases are water washable. They can absorb serous discharges in skin diseases. Some of the active ingredients in drugs when present in these base can be absorbed better by skin rather than other bases [26].

**d. Water soluble bases**

They contain water soluble components which can be incorporated in small quantity of water with spatula. Glycerin, propylene glycol, polyethylene glycol like water miscible fine agents can be used when the ingredients are insoluble. Heat may be required when large quantity of liquid is added in these bases [27].

These bases are non-irritating to skin, non-occlusive, non-staining, non-greasy and water washable in nature.

#### 2.1.2 Creams

Creams are semisolid emulsions which can be prepared by varying the proportion of water and oil. They are composed in two phases that is oil-in-water emulsions and water-in-oil emulsions.

Oil-in water creams when applied on skin; the continuous phase evaporates and increases the concentration of a water soluble drug in the adhering film. These are non-occlusive and they have emollient properties.

Water-in-oil emulsions are emollient and cleansing agents. It is preferred to an ointment because it spreads readily and less greasy in nature [28].

#### 2.1.3 Gel

Gel is a semisolid, jelly like formulation which may be soft and hard weak and tough in nature [29]. These formulations composed of high molecular polymers in an aqueous or alcoholic base. Gel is expanded throughout its whole volume by a fluid [30].

#### 2.1.4 Paste

Paste is a semisolid formulation. It is a suspension of powder in ointment. It is thicker and stiffer than ointments as it contain large quantity of solid material. It has good absorptive quality. Its application is not suitable in hairy part of body because of stiffness property [26].

#### 2.1.5 Jelly

Jellies are prepared from natural gums or also from synthetic derivatives of natural substances. Tragacanth, pectin, alginate and boroglycerin are the natural gums which are used for formation of jelly. Methylcellulose and carboxy methylcellulose like synthetic derivatives can also be used for preparation of jelly [31].

#### 2.1.6 Lotion

Lotions are liquid preparation in which active medicament are suspended and dissipated. Lotions are generally oil-in-water emulsions but sometimes water-in-oil emulsion lotions are also prepared.

Lotions generally contain 25-50% of alcohol. If they contain high amount of alcohol they can be dry. Lotions may also contain antiseptic emollient and haemostypic substance, extract of witch-hazel, menthol, glycerin, boric acid, alum, potassium oxyquinoline sulfate and chloroform [32].

#### 2.1.7 Liniments

Liniments have similar or lesser viscosity than lotions but they are rubbed during application. Liniments are prepared from quickly evaporating solvents like alcohol, acetone [32].

#### 2.1.8 Solution

Solutions are liquid preparation. It is generally aqueous but it can also contain other solvents like alcohol or propylene glycol in which one or more chemical substances are dissolved. Tincture, tincture of iodine, aromatic water, etc. are medicated solutions [7, 33].

**2.1.9 Emulsions**

Emulsions are mixture of unmixable liquid. There is dispersion of one liquid in another non-miscible liquid. The phase present in the form of droplet which is dispersed is called as internal phase and the phase in which the droplets are suspended is called the continuous or external phase.

The dispersed phase may have either a hydrophobic base (oil-in-water) or an aqueous base (water-in-oil).

**2.1.9.1 Types of emulsions**

a. Water-in-oil emulsion
b. Oil-in-water emulsion
c. Water-in-oil-in-water emulsion.
d. Oil-in-water-in-oil emulsion. [31, 34, 35, 36]

**2.1.10 Suspension**

Suspension is a heterogeneous mixture which contain solid particles that are adequately larger than one micrometer for sedimentation [37].

It consist of two phases, disperse or internal phase is made up of particulate matter which is dispersed throughout, the continuous phase, and second phase is continuous or external phase is a liquid or semisolid.

It is necessary to shake the container of suspension before administration [31, 38, 39].

**2.1.10.1.1 Types of suspensions**

a. Flocculated suspension
b. Deflocculated suspension

**2.1.11 Suppository**

Suppositories are used to deliver medicine into the rectal, vaginal or urethral orifice. It is a solid formulation. Suppositories are prepared by compression or fusion technique. Cocoa butter, glycerin, hydrogenated vegetable oils and polyethylene glycol like bases are used for formation of suppository [31].

**2.1.12 Powder**

Powder is a dry formulation of drugs or chemicals. Powder reduce friction and absorb moisture. It may be used for prickly heat or preventing microbial growth on skin. Particles size vary from very fine, fine, moderately coarse, coarse and very coarse. Very fine particle size covers large body surface area [31, 32].

**2.1.13 Aerosol**

Aerosol spray is a dispensing system which produces an aerosol mist of liquid particle. In aerosol system bottle like container contains a payload and propellant under pressure when the containers valve is opened, the payload expel out from hole. Generally in aerosols hydrocarbon (propane, butane and isobutene) and compressed gases like nitrogen, carbon dioxide and nitrogen oxide are used [31].

**2.2 Topical applications in Ayurveda**

In ayurveda topical applications are known as *lepas* and called as *bahirparimarjana chikitsa*.

**2.2.1 Lepa**

*Lepas* can be defined as, the medicines in the form of fine, smooth paste and used for external application [40].

**2.2.1.1 Synonyms of lepa [14]**

a. *Apta*- Ointments
b. *Lepa*- Pastes
c. *Lepana*- Creams
d. *Alepa*- Emplastrum
e. *Pralepa*- Jellies
f. *Pradeha*- Lotions

**2.2.1.2 Classification of lepa**

a. According to Sushruta [41] - *Pralepa, Pradeha, Alepa*
b. According to Sharangdhara [42] - *Doshgna, Vishagna, Varnya*

**A. Pralepa**

It is prepared from *sheeta virya* drugs and hence produces cooling effect on the body surface. It is applied as thin layer (*tanu*). It is used in *pitta dosha pradhan* skin diseases.

**B. Pradeha**

It is prepared from *ushna veerya dravyas* and produces warming effect on the body surface. It is applied as thick layer. It is used in *vata dosha pradhan skin diseases.*

**C. Alepa**

It is the combination of both above *lepas* used for *vrana shodhana, utsadana and ropana.*

**D. Doshaghna**

It locally alleviated vitiated *doshas*. *Punarnava, devadaru, sunthi, sigru, sidhartha* are the commonly used drugs for *doshaghna lepa*. It is applied in a thickness of $^1/_4$"

**E. Vishaghna**

It removes visha dosha. *Shirisha twak, yastimoola, tagara khanda, chandana moola, ela beeja, jatamansi* (rhizome), *haridra* (rhizome), *daruharidra khanda,bala moola, kushta moola and ghrita* are used for formation of *vishaghna lepa*. It is applied in the thickness of $^1/_3$"

**F. Varnya**

It imparts colour. *Rakta chandana, manjishtha, lodhra, kushta, priyangu, vatankuru, masura* are used for formation of *varnya lepa*. It is applied in a thickness of $^1/_2$"

**2.2.1.3 Preparation of lepa [40]**

The drugs are grounded to fine powder and then mixed with some liquid medium to obtain the paste form. For the preparation of *lepa*, water, *gomutra* (cow urine), *taila, ghrita, swarasa, kwatha* are some of the commonly used liquid mediums.

**2.2.1.4 Instructions for using lepas [14, 40]**

1. It should be applied in opposite direction of hair follicles.
2. It should be applied from below upwards.
3. It must be removed as soon as it dried up. After drying they lose their potency.
4. It should not be over coated.
5. It should be not applied during night.
6. Lepas should be used immediately after preparation.
7. They should not come in contact with eyes or mouth.

**2.2.1.5 Sa-veeryata avadhi [14]**

a. Vegetable source- 30 days
b. Mineral source- Indefinite

## 3. Conclusion

Ayurveda is ancient system of medicine which explains three elemental substances, the *doshas* (vata, pitta, kapha), and states that a balance of the *doshas* results in health, while imbalance results in disease. *Lepa* explained under *bahirparimarjana chikitsa* are differentiated from the drugs used and their *veeryas*. Preparation of *lepa* is easy and can be applied to body according to their thickness. As the drugs are added in *lepa* they can be used in skin diseases accordingly. This can have fewer side effects and are effective so can be used regularly.

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