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Pindi and *Bidalaka* - A Review

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ABSTRACT

Ocular Therapeutics can be broadly divided into two i.e., either in the form of *Kriyakalpa* (local therapeutics) or systemic therapeutics. *Kriya Kalpas* are the Topical ocular Therapeutics indicated in various *Netra Rogas* which has several advantages over oral administration of medicines as it provides more time for bio availability. Contemporary sciences also make use of transdermal absorption of medicines and are considered as an efficient method of drug delivery. As *Pindi* and *Bidalaka* are the modified forms of *Lepa Kalpana*, same route is followed by these two also. In this article probable mode of action and importance of *Pindi* and *Bidalaka* will be discussed.

Key words: *Pindi, Bidalaka, Kriya Kalpa*

INTRODUCTION

In Ayurveda, local treatment procedures of *Netra* are explained in the name of *Netra KriyaKalpa*. *Kriya* means therapeutic procedures used to cure the disease and *Kalpa* mean practical application. Therefore, *Kriyakalpa* means specific formulation used for therapies in Ayurveda *Netra Roga Chikitsa*. It includes selection of drug specific procedures, preparation of preparation of special drug form and finally it's proper application to eye. Any ocular disorder or condition can be classified as either *Amavastha* (with inflammatory signs) or *Niramavastha* (without inflammatory signs) based on its signs & symptoms there by dividing *Kriyakalpas* broadly into two categories. That is, those that can be done during both *Amavastha & Niramavastha* and others which can done only during *Niramavastha*. Both *Pindi* & *Bidalaka* are included in the first category i.e both can be done during *Ama* as well as *Niramavastha. Pindi* can be considered as a modified form of *Bidalaka*. References of *Bidalaka* are available in *Sharangadhara Samhitha* and in *Charaka Samhitha Chikitsa Sthana* while reference of *Pindi* is available only in *Sharangadhara Samhitha*.

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AIMS AND OBJECTIVES

To study the mode of action of *Pindi* and *Bidalaka*.

MATERIALS AND METHODS

A critical review of modern and *Ayurveda* literature regarding the subject was carried out in detail. For this purpose, modern medical books, *Ayurvedic* textbooks, previous research work, recent research papers and research articles, PubMed, Google scholar etc. were referred.

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Bidalaka

It is the application of medicated pastes over eye lids excluding eye lashes. Thickness of *Bidalaka* is similar to *Mukhalepa. Bidalaka* relieves burning sensations, discharge, excessive tears, swelling, redness, itching etc. Types and time of application of *Bidalaka* are.[1]

Types of *Bidalaka*	Thickness of *Bidalaka*	Time of application
Doshaghna	*1/4thAngula*	During daytime or whenever symptoms manifest. Contraindicated at night.
Vishaghna	*1/3rdAngula*	
Varanya	*1/2 Angula*	

Indication[2]

Burning Sensation, Discharges, Lacrimation, edema, congestion etc.

Contraindication[3]

At night and after applying *Bidalaka*: Speaking, laughing, crying, day sleeping, exposure to sunlight etc.

Samyak Lakshana: Free from Burning sensation, Discharge, Lacrimation, Edema & Congestion.

Bidalaka yoga common drugs.

- *Yastimadhu* (*Glycyrrhiza glabra*), *Gairika* (Fe2o3) *Saindhava* (rock salt) *Daruharidra* (*Berberis aristata*) and *Rasanjana* (*Berberis aristata* extract) with water.
- *Kumari* (*Aloe vera*), *Haridra* (*Curcuma longa*)
- *Haritaki* (*Terminalia chebula*), *Shunthi* (*Zingiber officinale*)
- *Lodhra* (*Symplocos racemos*), *Saindhava* (Rock salt) etc.

Pindi

Pindi is a modified procedure of *Bidalaka*. In this paste of medicines are covered in a cloth and placed over closed eyes. It is also called as *Kavalika*.

Indication[4]

Abhishyanda, Adhimantha, Sotha (swelling), *Netrakandu* (itching of eyes), *Kaphaja* and early stages of *Netrarogas* (eye diseases)

Samyak Lakshnas: free from *Sotha* (swelling), *Kandu* (itching).

Commonly used *Pindiyogas*:

Paste of

- *Vataja - Ernda Panchanga* (*Ricinus communis*)
- *Pittaja - Yashti* (*Glycyrrhiza glabra*), *Amalaka* (*Emblica officinalis*)
- *Kaphaja - Shigru leaves* (*Morieng oliefera*)
- *Kapha pitta - Triphala* (*Emblica officinalis, Terminalia chebula, Terminalia bellerica*)

Anatomy of Skin[5]

Skin consists of three layers

- Epidermis
- Dermis
- Subcutaneous Fat layer

Epidermis

It is multilayered mainly consists of two layers ie; stratum corneum and viable epidermis. Thickness varies from 0.8mm on palms to 0.06mm on eye lids. Stratum corneum is the outer most layer which consists of ten to twenty-five layers of keratinized cells called corneocytes. Stratum corneum is the principal barrier for penetration. Barrier nature of this layer depends on its constituents i.e.; 75-80% proteins, 5-15% lipids and 5-10% ondansetron material. As this layer is thinnest on eyelids, this will augment the absorption rate during *Pindi* and *Bidalaka.*

Dermis

It mainly consists of connective tissue. Composed of blood vessel, limp vessels and nerves. Also, contains hair follicles, sweat glands, sebaceous glands. Thickness varies from 3-5mm. The continuous blood supply thus keeps dermal concentration of permeate

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very low and the resulting concentration difference across the epidermis provides the essential driving force for transdermal permeation.

Hypo dermis (Subcutaneous Fat)

This layer supports dermis and epidermis and also serve as fat storage area. It helps to regulate temperature, provides nutritional support and mechanic protection. It carries principal blood vessels and nerves to skin and contain sense organs.

Factors affecting percutaneous Absorption

Biological factors

- Skin condition - Acids and alkalis, many solvents like chloroform, methanol damage the skin cells and promote penetration. Diseased state of patient alters the skin condition. The intact skin is better barrier, but the above-mentioned condition affects penetration.
- Skin age - As age increases the rate of penetration decreases. Children are more sensitive for skin absorption.
- Blood supply - Changes in peripheral circulation can affect transdermal absorption.
- Regional skin site - Thickness of skin, nature of stratum corneum and density of appendages vary site to site. These factors significantly in penetration.
- Skin metabolism - Skin metabolizes steroids, hormones, chemical carcinogens and some drugs. So, skin metabolism determines efficacy of drug permeated through the skin.

Physio chemical factors

1. Skin hydration - In contact with water permeability of skin increases significantly. Hydration is the most important factor for increasing the permeation of skin.
2. Temperature and pH - Permeation of drug increases ten folds with temperature variation, the diffusion coefficient decreases as temperature falls. Proportion of unionized drug determines the drug concentration.
3. Diffusion coefficient - Penetration of drug depends on diffusion coefficient of drug. At a constant temperature the diffusion coefficient of drug depends on properties of drug, diffusion medium and interaction between them.
4. Drug concentration - The flux of proportional to the concentration gradient across the barrier and concentration gradient will be higher if the concentration drug will be more across the barrier.
5. Patrician coefficient (K) - The optimal partition coefficient (K) is required for good action. Drugs with high K are not ready to leave the lipid portion of ski. Also, drugs with low K will not be permeated.
6. Molecular size and shape - Inversely proportional to permeation rate.

Fundamentals of skin permeation

Various layers of skin are not equally permeable i.e.; epidermis is less permeable than dermis also, stratum corneum greatly hamper permeation. The average human skin contains 40-70 hair follicles and 200-250 sweat ducts per square centimeter. Especially, water soluble substances pass faster through these ducts still these ducts don't contribute for skin permeation. Therefore, most neutral molecules pass through stratum corneum by passive diffusion.

Series of steps in sequence

Sorption of a penetrant molecule on surface layer stratum corneum.

↓

Diffusion through it and viable epidermis and finally reaches to dermis.

↓

The molecule is taken up into the micro circulation for systemic distribution.

Permeation Pathways

Percutaneous absorption involves passive diffusion of the substances through the skin. A molecule may use

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two diffusional routes to penetrate normal intact skin, the appendageal and epidermal route.

1. Appendageal Route - Comprises transport via sweat glands and hair follicles with their associated sebaceous glands.
2. Epidermal Route - This may take - Either transcellular (Intra cellular and inter cellular pathways.
    a) Trans Cellular - Means transport of molecules across epithelial cellular membrane. These include passive transport of small molecule, active transport of ionic and polar compounds and endocytosis and transcytosis of macro molecules.
    b) Para cellular - Means transport of molecules around or between the cells. Tight junction or similar situation exists between the cells.

The principal pathway taken by a permeant is decided mainly by the partition coefficient (logk). Hydrophilic drugs partition preferentially into the intra cellular domains whereas lipophilic permeants travel the stratum corneum via the inter cellular route.

Discussion

As *Pindi* and *Bidalaka* are external application of medicated paste over eye lids, mode of action of these therapies follows the transdermal pathway for absorption. As the eye lids skin has a thinner stratum corneum, there by showing lower impedance which could be a reason for higher drug permeation through eye lid skin. Since the appendages are not significantly present over the eye lid skin. Most of the absorption occurs via epidermal route. Almost in all *Yogas* of *Pindi* and *Bidalaka* paste of medicated drugs are usually made in water or in any other liquid medium. Hence, hydrophilic portion absorbs intra cellular domain whereas if any lipophilic part present absorptions take through inter cellular route and enters the micro circulation. That is palpebral arteries (lateral and medial palpebral artery) which in turn reaches conjunctiva via conjunctiva arteries as these are derived from arterial arcade of eye lids.

Regarding the duration of these procedures, there is no direct reference for the exact time period. It is mentioned as; as soon as the *Lepa* gets dried it should be removed carefully by moistening. This clearly indicates that hydration is very important for the absorption of molecules transdermally. Absorption rate is more when the concentration gradient is more at the barrier making *Varnya* type of *Bidalaka* more fastly absorbed one compared to other two types of *Bidalaka* that is *Vishaghna & Doshaghna* types. As *Paschath karma* of *Bidalaka*, it is mentioned that after the removal of *Lepa* the lid should be anointed with oil which helps in the rapid uptake of lipophilic part through inter cellular route. Absorption during *Pindi* may be higher than *Bidalaka* as there is a pressure factor acting apart from all other factor.

Conclusion

Pindi and *Bidalaka* can be considered as an efficient as well as easy method of drug absorption to the eyes mainly anterior segment of eyes especially during the first stage of a disease (*Ama* condition). Despite *Seka* (which can be done during *Amavastha),* these procedures help in retaining the medicines over the eye lid for long time and helps in controlled absorption through eye lid.

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