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Functional Overview Of The Formulations Used For External Applications In Tvak Vikaras (Skin Disorders)

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ABSTRACT

Tvak (skin) is not only an important enveloping protective layer of the body but also a sense organ. There are many references about the *Tvak* in different classics, starting from *Samhita* and *Sangrah Granthas*, yet there is no symmetrically arranged knowledge about this vital organ of the body is available at one place. *Tvak vikaras* are widely prevalent in the society and detailed description of these disorders with etiological factors including hereditary ones; symptomatology and therapeutic measures have been described in a very scattered manner in *Ayurved* classics. The skin is not only important for studying the structure and function, but also application of the same in understanding the disorders arise out of it. Unlike as in the other systems of medicines like allopathic system where the separate dermatology has been developed our system has no such separate branch, but our *Acharyas* have mentioned various formulations for the skin disorders. In our *Ayurved* classics many different *Bahya kalpanas* (External Applications) have been mentioned which are used for both preventive as well as curative aspect, but while searching down the texts very scattered references are available regarding the understanding of functions of different external applications on the skin. For the proper and practical understanding of functional aspect of *Bahya Kalpana*, it is necessary to study this aspect in the light of knowledge of both Modern and *Ayurvedic* concepts. In other words synthesis of ancient and modern concepts will be a worth consideration, so this present study focuses on the functional overview of the formulations used for *Bahya kalpana* in *Tvak vikaras*.

KEY WORDS

Tvak (Skin), *Bahya Kalpana* (external Applications), *Ayurvedic* Concept, Modern Concept

INTRODUCTION

A. Ayurvedic concept

The *Tvak* (skin) in the human body is a covering provided by mother nature to a human being and if that cover is spoiled or torn anywhere it either looks ugly or may be troubled with other serious anomalies. The first goal of *Ayurved* is to promote "the health of the healthy" and second one is to "free the human beings from the diseases". In hot pursuit to achieve these goals, the learned *Acharyas* have formulated, propagated and professed various formulations which take care of the skin in healthy as well as diseased conditions. Various formulations and procedures like *Pralepa, Pradeha, Malahara, Upanha, Taila, Avachurna, Abhyanga, Avagahana, Parisechana* etc. have been and are being used with great effectivity pertaining to the requirement of the skin, keeping in mind the *Prakriti* of a person in healthy condition and the disease in the diseased.[1, 2]

From the time immemorial and as described by *Acharya Sushruta*, the formulations for *Tvak* have been used for basically three purposes, as (a) *Doshaghna* (b) *Vishaghna* and (c) *Varnyakara*. Thus, as stated above, the formulations for *Tvak* were used and are being used as skin protectives, disease removing and aesthetical purposes. Here, it becomes essential to understand the whole process of the effect of drug on the *Tvak* in terms of its structuro-functional aspect which may be depicted as under. Two theories may be forwarded as per the *Ayurvedic* ideology pertaining to absorption and activity of the drugs when applied externally and reaching into the body through the *Tvak*. [1, 2]

1. Pancha Mahabhuta Siddhanta

It has been said that every particle of the universe is made up of *Penta* elements - *Prithvi, Jala, Teia, Vayu* and *Akasha*, and a state of equilibrium between those components brings the (*Satcitanandmaya*) Balanced state of health. Imbalance in the proportion of these *Mahabhutas* would give rise to a disease. Each and every formulation for *Tvak* would also be *Pancha Mahabhautika* and following the *Samanya - Vishesha* principle, the body would be able to increase or decrease the essential and non essential constituents. Thus, if there is a need of *Jala Mahabhuta- Snana, Parisheka, Avagahana* may be effective. The decrease *Parthiva* contents may be combated by applying a *Lepana* of mud or the drugs listed under *Parthiva Varga*. The deficit of Agni *Mahabhuta* may be compensated through either sunlight or with the *Abhyanga* and *Lepana* of the drugs having -*Agneya* qualities and so on. [1, 2]

2. Tridosha Siddhanta

In order to give a compact form and to make its functional approach more rational, the penta-elemental theory has been divided into the *Tridosha* theory, where the body is said to be resting on the tripods of *Vata*, *Pitta* and *Kapha Doshas*. Further five subdivisions each of these entities have been described and have been attributed as to be performing different functions in the human being. According to this ideology the equilibrium between these *Doshas* yields health whereas various drugs and formulations along with proper use of procedures help to maintain the health or to cure a illness. For the betterment of increased *Kapha* the drugs having *Kaphaghna* properties may be used in the form of *Avachurna* or *Abhyanga* with oil having the *Ushna-Teekshna* properties as the base of the medicine utilized for *Abhyanga*. In the same way similar approach is to be followed for tackling *Vata* and *Pitta Doshas*. [1, 2 and 3]

3. Absorption and Activity of the drugs

- As it has been said in the *Tridosha* theory that the whole human body has the prevalence of *Bhrajaka Pitta* and *Vyana Vayu* whereas no separate type of *Kapha* has been said to be dwelling in the *Tvak* but it has also been said that the function of *Sleshma* is to bind all the *Dhatus* with each other and thus, may be said that the *Sleshaka Kapha* which is said to be present in every joints, is present at the joints of various layers of *Tvak* too.[1, 2, 3 and 4]

- The function of *Bhrajaka Pitta* is said to metabolize the substance of drugs applied to the skin whereas one of its main functions is to manifest the *colour* and complexion of the *Tvak*. In function of metabolism the activities of *Samana Vayu* supported by *Vyana Vayu* is of great importance. *Ayurved* also propagates the theory of *'Srotomaya Purusha'* indicating that the whole human body is porous. When the medication is applied in form of *Lepa* or *Pradeha*, the minute particles of the substance penetrate into the *Tvak* owing to the gravitational pull and the weight of the drug. The base used in *Malahara* aids these function. In *Abhyanga* the *Ashukari* and *Teekshna* properties of the medium viz. *Ghrita*, *Taila*, *Vasa* or *Majja* and the pressure of the hand help the drug to penetrate the *Tvak* whereas the *Avagahana* and *Parisheka* act by diffusing into the *Tvak* pores due to *Laghuta* and *Sukshmata*. Above all, the *Upashoshana* property of *Vayu* (*Vyana* and *Samana* especially) would play a major role in the penetration, and absorption of the medicaments applied over the *Tvak*. After being absorbed in the *Tvak*, the drugs would act upon the body, pertaining to its *Veerya* (active Principles) and in some cases according to its *Prabhava*. [1, 2, 3 and 4]

B. Modern concept

☞ Ointments, creams, lotions, topical solutions and Linctuses represent the most frequently used dosage forms in dermatology. However, other preparations as paste, liniments, powders, aerosols are also commonly used.

☞ Preparations are applied to the skin either for their physical effects, that is for their ability to act as skin protectants, lubricants, emollients, drying agents etc. or for the specific effect of the medicinal agents which may be present. Preparations sold over the counter without the requirement of a prescription frequently contain mixtures of medicinal substances and are used in the treatment of such conditions as minor skin infections, itching, burns, diaper rash, insect bites and stings, athlete's foot, corns, calluses, warts, dandruff, acne, psoriasis and eczema. Skin applications which require a prescription generally contain a medicinal agent intended to counter a specific diagnosed condition.

☞ It is always desirable in treating skin disease that the drug in the medicated applications penetrates fastly through the surface into the skin, but it is not generally the intention that the medication enters the general circulation too. However, once pass the skin a drug substance finds itself in proximity to blood capillaries feeding the subcutaneous tissues and absorption into the general circulation is not unlikely. In fact, such absorption commonly results after typical application of certain preparations as evident by detectable blood levels of the drug and the urinary excretion of the drug or its metabolic products. [5, 6]

1. Percutaneous absorption and penetration of the skin by drugs

☞ The absorption of the substances from outside the skin to positions beneath the skin, including entrance into the blood stream, is referred to as percutaneous absorption. In general, the percutaneous absorption of a medicinal substance present in a dermatological preparation such as an ointment, cream or paste depends not only on the physical and chemical properties of the medicinal substance but also on its vehicle and the condition of the skin too. It is well known that although a pharmaceutical vehicle may not penetrate the skin to a great extent nor actually carry the medicinal substance through the skin, but the vehicle does influence the rate and degree of penetration of a medicinal agent. The degree and rate vary with different drugs and with different vehicles. Therefore, each drug substance vehicle combination must be examined individually for percutaneous absorption and therapeutic efficacy.

☞ Drugs could possibly penetrate intact skin after topical application through the walls of the hair follicles, through the sweat glands or the sebaceous glands or between the cells of the horney layers. Naturally, broken or abraded skin is easily entered by applied substances, but such penetration does not really constitute true percutaneous absorption. In fact, the applications of medicinal substances to skin areas

devoid of their normal barrier may lead to very rapid drug entrance into the blood stream, an event that is usually not welcomed in topical therapy.

☞ If the skin is intact, the main route for the penetration of drug is generally the epidermal layer rather than through the hair follicles or gland ducts. Since the surface area of the latter is rather minute compared to the area of skin containing neither of these anatomical elements. The film covering the homey layer is not generally continuous and presents no real resistance to penetration. Since the composition of the film varies with the proportion of sebum and sweat produced and the degree of their removal through washing and sweat evaporation. The film is not a true barrier to dry transfer, since it has no definite composition, thickness or continuity.

☞ The homey layer of the skin, about 20 to 40 µm thick is chiefly composed of keratin- a protein substance and lipids. It is considered to act as a sponge being capable to hold or absorb water with both lipid and water soluble substances entering it. The barrier layer is only about 10 µm in thickness and is through to prevent the penetration of molecules having molecular weight of greater than about 250 to 300. The resistance to penetration is considered not to be due to the smallness of the pores of the barrier layer, but rather to the molecular interactions between penetrating substances and the pose contents. Molecules that do penetrate this barrier layer are either bound to the living epidermis or make their way to the lymphatic or blood vessels and are carried away for detoxification and excretion. [5, 6 and 7]

2. Factors affecting Percutaneous absorption

Among the factors playing an important part in the percutaneous absorption of drugs are the nature of the drug itself, the nature of vehicle, the condition of skin and the presence of moisture. There are many reports concerning the influence of each of these factors on the percutaneous absorption of specific drugs. Although general statements applicable to all possible combinations of drug, vehicle, and skin condition are difficult to draw, the consensus of the majority of the findings may be summarized as follows [7, 8 and 9]

a) The primary requirement for topical therapy is that the drug incorporated in a vehicle reach the skin surface at an adequate rate and in sufficient concentration.
b) Drug concentration is an important factor, generally, the amount of drug percutaneously absorbed per unit of surface area per time interval increases as the concentration of the drug substance in the vehicle is increased.
c) Maximum drug is absorbed through percutaneous absorption when drug substance is applied to a larger surface area.

d) The drug substance should be attracted by the membranes of the skin to a greater extent than the drug molecule is attracted to the vehicle in which it is permuted for percutaneous absorption in order for the drug to have the tendency to leave the vehicle in favour of the skin on the other hand, the drug must not have such a great affinity for the tissues that it remains lightly bound and fans to penetrate as deeply as is required of it. For instance, a local anesthetic substance must penetrate to the nerve fibers to be effective.

e) In general, the greater the solubility of a drug in oil, the greater its percutaneous absorption. However, some degree of solubility of the drug substance in both oil and water is essential for effective percutaneous absorption. In essence, the aqueous solubility of a drug determines the concentration presented to the absorption site and the partition coefficient strongly influences the rate of transport across the absorption site.

f) Drug absorption appears to be best from vehicles that easily cover the skin surface, mix readily with the sebum, and being the drug into contact with the tissue cells for absorption.

g) It is generally believed that the vehicle itself is incapable of promoting the absorption of non absorbable drugs distributed in it but that it may have the capability of modifying the absorption patterns of drugs that are absorbable without the presence of vehicle.

h) The absorption of an absorbable drug is better from animal and vegetable oils than from mineral oils because the former types penetrate the skin more readily. Also, organic solvents such as ether, acetone and benzene can enhance the absorption of a drug dissolved in them through their penetrability.

i) Vehicles that increase the amount of moisture imbibed by the skin generally favorably affect the percutaneous absorption of drugs. Oleaginous vehicles act as moisture barriers through which the sweat from the skin cannot pass and the skin therefore remains occluded, generally resulting in an increased hydration of the skin beneath the vehicle. Vehicles of the water in oil emulsion type are probably next in effectiveness to oleaginous vehicles in enhancing the hydration of the skin. Vehicles containing humectants like glycerin to the ointment moist and from drying out have a tendency to draw moisture from the skin when conditions of low humidity prevail and actually can reduce the moisture content of the skin.

j) Hydration of skin is influenced not only by the type of vehicles (eg. oleaginous) but also by the absence or presence of a bandage (and the type) over the medicated applications. In general, bandaging a non occlusive application such as a water-miscible vehicle will enhance the moisturizing effect of the skin through the inhibition of the evaporation of the sweat and thereby enhance absorption. An occlusive bandage is more effective in this regard than a loosely woven non occlusive one.

k) In general, the amount of rubbing in or in function of the topical application will have a bearing on the amount of drug absorbed. The longer the period of in function, the greater the absorption.

l) Percutaneous absorption appears to be greater when the drug is applied to skin with a thin homey layer than with the one that is thick eg. the absorption from such sites as the palms of hands and soles of the feet, which have thick homey layers, being comparatively slow.

m) Generally, the longer the period of time the medicated application is permitted to remain in contact with the skin, the greater will be the absorption. However, changes in the hydration of the skin during the application period or the saturation of the skin with the drug could preclude significant additional absorption with increasing time.

These general statements on percutaneous absorption apply quite well to skin in normal state. In injury to skin or in disease states of varying dimension, the differences in drug absorption will occur.

C. DISCUSSION AND CONCLUSION

Functional Overview of different dermatological formulations for healthy and diseased skin, described in *Ayurvedic* as well as Modern Dermatology is discussed elaborately here along with their probable mechanism, absorption and action from *Ayurvedic* and Modern point of view. The talk reveals that the particular preparation is to be selected either according to the place of the *Vikriti* or according to the type of *Vikriti* so that the preparation would be effective for the same. Physicians of both the sciences always prefer that remedy which could either correct the function or to heal the *Vikrita* condition of the *Tvak*. Hence, it can be said that this particular field in which the different formulations are being presented are also similar on the principles point of view. The study reviewed and discussed to show the probable mode of absorption of different skin preparation in health and disease condition from both *Ayurvedic* as well as Modern point of view.

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