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POSSIBLE SCIENTIFIC REASONS BEHIND THE SUPPORTIVE ACTIONS OF STHANIKA SNEHANA AND SWEDANA

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ABSTRACT

Ayurveda has a holistic approach towards healing and complete cure of a disease. It is not only a mode of treatment but a whole science of life. So it includes not only the conventional oral rout of medication but also the locally acting methods, important of which are *Abhyanga/ Snehana*(Oleation) and *Swedana* (Sudation). These two methods are widely described in Ayurveda as the pre-procedure preparation in *Panchakarma* as well as main therapy. In this article, we will be discussing about the probable mode of action of these two methods. We will be discussing about the Liposomes, the Trans dermal Drug Absorption and the Cell Membrane Structure and ease of transport through cell membrane with oil base preparation as a vehicle. Also the supportive action of *Swedana* on the basis of hyperthermia and movement of molecules across the cell membranes will also be considered.

KEYWORDS: *Abhyanga*, Hyperthermia, Liposomes, Massage, *Swedana.*

INTRODUCTION

Ayurveda is said to be an eternal science because the principles on which the science is based are undoubtedly working and are true irrespective of the age of time in which they are being used. Though it is true, to survive in the modern era, they should be tested again and proved to be with time. I have tried to explain how Sthanika Snehana and Swedana must be acting to produce the effect on the basis of theories of modern science.

CONCEPT OF *ABHYANGA SNEHA* AND *SWEDANA*

Sneha and Sweda are to therapies in Ayurveda which are described mainly for pacification of Vata Dosha[1], among the Tridoshas[2] in Ayurveda. Lets now get a brief idea about the procedures.

ABHYANGA SNEHANA KARMA

The etymology of the word '*Sneha*':

The word '*Sneha*' is derived from the root *Snih*. It has two meanings, one being *'Snih-preetau'* means to render affection and the other *'Snih-Snehane'* meaning to render lubrication.

The term *Sneha* implies that a substance that brings oiliness or unctuousness. *Sneha* literally means oiliness, unctuousness, fattiness, greasiness, lubricity, viscidity, affection, love, kindness and tenderness [Monier Williams 1899 and Apte 1970].

Snehana:

Snehana is the word to denote a therapy which promotes *Snigdha Guṇa* in the body. In *Shabdastoma Mahanidhi*, the term *Snehana* is used only for external application of *Sneha* to the body.

This includes both *Snehapana*(internal use of *Sneha*) and *Abhyanga*(local application of *Sneha*). In *Ayurveda Sneha Paka* is a method of preparing formulation with *Snehadravya* as the base.

Sneha Kalpana / paka may be defined as "A pharmaceutical process to prepare oleaginous medicaments from the substances like *Kalka* (herbal paste of different parts of botanicals), *Kwatha* (specifically prepared decoction in accordance of Ayurvedic principles) or *Drava Dravya* (any other liquid such as milk, self expressed juices, meat juice, etc.) taken in specific proportion and by subjecting them to unique heating pattern and duration to fulfill certain pharmaceutical parameters, according to the need of therapeutics.[3]" This means that, *Sneha Kalpana/paka* is a unique dosage form in *Ayurveda*. Aim of this arrangement is mass transfer of the aqueous and lipid-soluble active principles of all treated herbal drugs and material of animal and mineral origin, if any, in accordance of established formulae quoted in authoritative text books of *Ayurveda* which should serve therapeutic objectives as per indications of the classical treatise of *Ayurveda*. [4]

Out of the four types of *Sneha* used in *Ayurveda*, the *Taila* is vegetable origin and *Ghrita* is animal origin so a possibility of similarity in physiological and chemical nature to that of the cell membrane cannot be ruled out. But the basic constituent of *Sneha* is fatty acids which ultimately intensifies the penetration of oil based substances through the cell membrane.

SWEDANA KARMA

Swedana is the process by which the sweat or perspiration is produced in the body by using various methods.

Definition:

Swedana is the procedure which relieves Stiffness, Heaviness and Coldness of body and produces Sweating[5].

Properties of Swedana Drugs:

The drugs used for Swedana therapy should possess following properties[6]:-

1. Ushna – Hot
2. Tikshna – Sharpness
3. Sara – Mobility
4. Snigdha – Unctuousness
5. Ruksha – Rough, Dry
6. Sukshma – Subtle
7. Drava – Liquid
8. Sthira – Immobility
9. Guru – Heavy

Description about the procedure:

Many procedures of Snehana and Swedana have been described in Ayurveda. In this article, the abhyanga and Baluka pottali sweda are considered to describe the procedure.

a)Collection of the materials

For *Snehana*-

5 ml of oil is taken and made lukewarm.

For Swedana-

100g of pure, uniformly sized, clean sand is taken. It is warmed to the required tolerance of the heat by the patient, by a uniform flame on a clean pan. This warm sand is then taken in the required size of the clean, white cloth and tied firmly to make the bolus of the required size, either one or more in number.

b) Preparation of the patient:

After the daily routines in the morning, the patient should be asked to lie down in a comfortable position.

Procedure:

First *Snehana* is done. Oil is applied over the required portion and *Abhyanga* is done in a circular or radial fashion as per requirement. Then the fomentation should be applied to the parts affected according to the need of the individual.

The warm sand bolus of the required temperature should be applied on the affected parts of the body. The *Swedana* is to be conducted according to the *Pinda Swedana*.

The temperature of the bolus must be maintained uniformly so that the patient should not feel discomfort either by more heat or less heat. If the sand becomes cold, the bolus must be changed and again a warm bolus should be applied on the affected part, till the local symptoms

are reduced, or when the patient feels satisfied. In each affected part, usually Snehana and Swedana is done for 10-15 minutes each.

DISCUSSION:

Now as we know what these to procedures actually mean to Ayurveda, lets discuss about the probable mode of action of these procedures on the basis of theories of modern science.

Cell membrane biology – the structure and physiology

According to the "fluid mosaic model" proposed by Singer and Nicolson (1972) for the cell membrane structure, the following postulations are proposed to explain the dynamism of cell membrane.

a) Lipid and integral proteins are disposed in two kinds of mosaic arrangement in the cell membrane.

b) Biological membranes are quasi fluid structures in which both the lipids and the integral proteins are able to perform translational movements within the bilayer.

c) Integral proteins of the cell membrane are intercalated into an almost continuous lipid layer.

This model explains the membrane fluidity with the fact that both the proteins and lipid molecules in the cell membranes have the freedom of different movements within the bilayer. The lipid molecules have an inherent capability of movement and this movement is directly proportional to the temperature. Unsaturated fatty acids have a lower melting point in comparison to the saturated ones and thus melt at comparatively lower temperatures. This is why cell membrane lipids (unsaturated fatty acids) remain fluid and thus dynamic at physiological temperatures. This model proposes a dynamic nature for the cell membrane where the integral protein sub-units float freely like icebergs in a sea of phospholipids.

Studies with nuclear magnetic resonance and electron spin resonance have clearly suggested that the lipid bilayer has dynamic properties such as flexion or rapid internal motion within the lipid molecules, lateral diffusion, flip-flop motion or transfer of a lipid molecule from one side of the bilayer to the other and rotation around its axis. All these motional properties are temperature dependent and can be increased many fold by heat application.

The pharmacokinetic of any drug is dependent on transport of the drug across the biological membrane, which is a bilayer of phsopholipid and cholesterol molecules. The lipid soluble drug is passively diffused across the membrane in the direction of its concentration gradient. The membrane playing no active role in the process. Before defusing, the drug dissolved in the lipoidal matrix of the membrane. The rate of transport being proportional to lipid : water

partition coefficient of the drug. The more lipid soluble the drug, the higher the concentration and quicker the diffusion.

Cellular membrane – consists of **bilayer membrane** with **aqueous pores**, **paracellular spaces or channels** between endothelial and epithelial cells.

In the field of conventional pharmaceutics, various new dosage forms are evolved continuously with basic purposes to increase bioavailability of the drug which may show maximum therapeutic effect. Liposome is one such advanced dosage form in which nanoparticles comprising lipid bilayer membranes surrounding an aqueous interior are formed. The amphiphilic molecules used for the preparation of these compounds have similarities with biological membranes and have been used for improving the efficacy and safety of different drugs. In this dosage form, the active compound can be located either in the aqueous spaces, if it is water-soluble, or in lipid membrane, if it is lipid soluble.[7]

It seems that these two dosage forms, i.e., *Sneha Kalpana/Paka* of *Ayurveda* and Liposome of conventional medicine, are very much similar in their origin and character as both are lipoidal in nature.

In the preparation of *Sneha paka,* particular matter and media in specific ratio is taken and heated along with oil/ghee at a very specific temperature with certain duration till the completion test. Here, the principle is to transfer active constituent of herbs in lipid and water according to its solubility.[8]

Liposomes are prepared on the same pharmaceutical principle; however, in case of liposomes, heating is not only compulsory method of preparation (as the case with products of S*neha paka)*, and here other methods such as sonication, homogenization, shaking, etc., are also applied. The lipid-soluble compound remains in the outer lipid bilayer and water-soluble component remains in the middle aqueous space.

By keeping above facts in mind, we may assume that S*neha paka* may have the same structure and functions as that of liposome (basic hypothesis of this paper), or in other words, liposomes are modified/developed form of the traditional S*neha Kalpana/paka.*[9]

Abhyanga & Sthanika Swedana-

Scientifically it can be said that during *Abhyanga* and *Swedana* three therapeutic phenomenons works together.

1. Hyperthermia
2. Transdermal drug absorption
3. Massage

1. Hyperthermia:

Hyperthermia is a very important therapeutic measure known since a long.

Local hyperthermia produced during Swedana procedure has very vital physiological and therapeutic effect and proved very much effective in joint degenerative conditions[10,11].

1) It improves local blood and lymphatic circulation and thereby improving local tissue metabolism[12].

2) Hyperthermia Reduces inflammation by modifying secretion of various inflammatory mediators[13,14].

3) Hyperthermia relaxes local musculature by physical effect of heat and thereby reduces pain.

4) Studies have shown that short term hyperthermia decreases the level of stress hormone norepinephrine and hence produces parasymphetic dominance.

5) A study has shown that hyperthermia increases the rate of trance dermal drug delivery and there by helpful during *Abhyanga* followed by *Sweda* for better trance dermal drug absorption[15].

2. Drug absorption:

Trance dermal drug delivery is the newly emerged system of drug delivery. These therapeutics are safe, efficacious and may improve patient treatment compliance. Pharmacologic considerations including avoiding first pass effect and biotransformation may also be important advantages of transdermal administration.

The advantages of using transdermal drug delivery include bypassing the gastrointestinal tract and hepatic first pass biotransformation and metabolism, control of absorption and the availability of multiple sites for application. Avoiding the gastrointestinal environment which may significantly affect bioavailability would seem intuitive. The use of transdermal administration may also reduce hospitalization time and be utilized in home care.

Mechanisms of Absorption[16]

The skin has been referred to as the largest organ system accounting for a large

proportion of the body's total surface area. Due to easy access and the ability to maintain applied formulations for prolonged periods of time, transdermal drug administration has become a dynamic area of investigation[17,18].

Basically, the skin is composed of three layers consisting of the epidermis, dermis and subdermal tissue. The epidermis in haired skin of the dog and cat is composed of four layers including the stratum corneum, stratum granulosum, stratum spinosum and the stratum basale. The cornified layer of the stratum corneum appears to provide the ratelimiting step to transdermal drug

absorption. Once thought to be a fairly inert layer, it is now known that this layer actively opposes absorption from outside and loss from within.

Penetration of the skin depends on diffusion therefore the hydration of the skin will affect permeability. Absorption via the transdermal route primarily occurs by passive diffusion through the stratum corneum[17]. The rate of diffusion is dependent on the permeability coefficient of the drug, the applied concentration of the drug, the surface area of the skin exposed to the drug and the thickness of the epidermis (Fick's law of diffusion).

Studies have revealed the fact that lipoidal barrier is very much suitable for penetration of drug molecule through stratum corneum [4,7,8].On this basis we can assume that in the procedure, Taila may serve lipoidal barrier for the penetration of drug molecules of Bala and exerts immediate effect. Moreover heat applied during Baluka Swedana increases the rate of drug absorption.

3. Massage

As massage is always applied before and along with *Sweda,* therapeutic effect of massage should also be taken into consideration. Massage can increase the fresh oxygenated blood supply to the muscles and organs, and aid the drainage of venous blood, promoting the removal of waste products from the body. By increasing the flow of lymphatic material, waste removal is also aided and white blood cell production is increased, boosting one's natural immunity. Massage influences the equilibrium in the nervous system.

There are few newly developed scientific concepts regarding mode of action of massage:

Pain modulation:

The precise mechanism of action in massage therapy is not known. It has been proposed that increased parasympathetic activity and a slowed-down physiological state may underpin the behavioural and physiological processes associated with massage. As discussed by Wright and Sluka, massage is thought to induce a variety of positive physiological effects that may contribute to tissue repair, pain modulation, relaxation, and improved mood. For example, these authors point to research showing that massage has beneficial effects on arterial and venous blood flow and edema. In addition, they note that vigorous massage has been shown to increase local blood flow and cardiac stroke volume, as well as improve lymph drainage; massage also appears to have an anticoagulant effect. Finally, Wright and Sluka maintain that massage may activate segmental inhibitory mechanisms to suppress pain and that some techniques may activate descending pain inhibitory systems.

CONCLUSION

Thus Medicated *Snehapana, Abhyanga* and *Sweda* altogether work themselves in *Samprapti* and along with that, they act synergistically and ultimately enhance the bioavailability of drugs.

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