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PHARMACODYNAMICS OF BASTI CHIKITSA, AYURVED AND MODERN POINT OF VIEW

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ABSTRACT

Basti Karma is one of the modalities among the five bio cleansing or detoxifying performed in ayurved treatements, its mode of action occurs due to effects of drugs used and their mechanism of acton.Basti is known as '*ardha chikitsa'*. It is important to know the mode of action through which it acts upon body. Superficially it seems that basti dravya act by stimulating peristalsis due to their large volume or they cause osmotic retention of water in the bowel. Rectal veins drain the lower part of the rectum and enter into the inferior vena cava and bypass the liver before entering the general circulation. The two main ingredients used as per types of basti are oil and decoction. According of ancient aacharyas Basti acts on the virtue of its Veerya, it reaches every corner of the body from the toes to head, drags the morbid doshas from every part of the body and expels them from the body. Mainly basti has two actions, expelling the vitiated doshas (morbid substances or toxins) and nourishing the body. Its first significant action is facilitating the excretion of morbid substances responsible for the disease process into the colon from where they are evacuated.

KEYWORDS: Basti, ardha chikitsa, veerya, osmotic retention, vitiated dosh.

INTRODUCTION

Basti is the prime treatment in *shodhana*. Basti is one of the five procedures of panchakarma. In ayurveda it is considered as one of the most important treatments for many diseases according to Ayurvedic literature. Basti is commonly used alone or along with Ayurveda medication, in all Vata Vyadhi (neurological disorders) and is also indicated in various diseases as *Anaha* (Distended abdomen), *malavroadh* (Constipation), *Adhman* (Abdominal spasmodic pain), *Vatrakta* (Gout), *Pleeha* (Splenomegaly) and many more. The type of basti where decoction is the major part is called as *asthapana basti* or *niruha basti* and the basti in which major part is oil or other *sneha* (oleaginous substance) is called as *anuvasana*. The desired effect of basti depends on several determinanants. According to the classical texts basti administration is done with the help of animal bladder *(bastiputaka*) and specially prepared metal / wooden nozzle / catheter *(bastinetra*), the whole assembly is called as *bastiyantra*.

Pharmacodynamics is the branch of pharmacology concerned with the effects of drugs and the mechanism of their action. It is the study of a drugs molecular, biochemical and physiologic effects or actions. It comes from Greek words "pharmaco'' meaning "drug", and "dynamics'' meaning power. The study of how drugs effect the human body given their mechanism of action. In short pharmacodynamic analysis is important because it helps to understand how a drug behaves in the body and how the body reacts to it.

Pharmacodynamic actions include

- Stimulating activity by directly inhibiting a receptor and its downstream effects.
- Depressing activity by direct receptor inhibition and its downstream effects.
- Antagonistic or blocking a receptor by binding to it but not activating it.
- Stabilizing action, where the drug apparently behaves as nether an agonist nor antagonist.
- Direct chemical reactions (beneficial in therapy and also as an adverse event)

Any of these factors can work both therapeutically as well as precipitate an adverse event.

General Mechanisms of Drug Actions

Drugs produce their effects by interacting with biological targets, but the time course of the pharmacodynamic effect is dependent on the mechanism and biochemical pathway of the target. Effects can be classified as direct or indirect and immediate or delayed. Direct effects are usually the result of drugs interacting with a receptor or

enzyme that is central to the pathway of the effect. Beta-blockers inhibit receptors that directly modulate cAMP levels in smooth muscle celctuils in the vasculature. Indirect effects are the result of drugs interacting with receptors and proteins of other biologic structures that are significantly upstream from the end biochemical process that produces the drug effect. Corticosteroids bind to nuclear transcription factors in the cell cytosol, which translocate to the nucleus and inhibit transcription of DNA to mRNA encoding for several inflammatory proteins.[1]

Immidiate effects are usually secondary to direct drug effects Neuromuscular blocking agents such as succinylcholine, which consists of two acetylcholine (AcH) molecules linked end to end by their acetyl groups, interact with the nicotinic acetylcholine receptor (n AChR) on skeletal muscle cells and leave the channel in an open state, resulting in membrane depolarization and generation of an action potential, muscle contraction and then paralyses within 60 seconds after administration.[2]

Pharmacodynamics of Basti Dravya

The anus is the main root of the body and having blood vessels in it, if we administer the basti in anus nourishes all the limbs and organs of the body. Basti eliminates the vitiated doshas from the rectal route. Basti has the prime function of colon cleansing. The colon cleansing has the effect on whole body thatcan be compaired to the *Srotoshodhana*. The rationale for colon cleansing is the concept of "auto-intoxication", the idea that food enters the intestine and rots.[3] Basti has two types *Niruh* or *Asthapan Basti* (decoction enema) and *Sneha* or *Anuvasan Basti (*oil enema)[4] *Niruha Basti* is a mixture of oil, honey, '*kwatha'*(decoction)and '*Kalka*'(fine paste obtained after wety grinding of the plant material). These materials are immiscible with each other. A homogeneous mixture is required for actual administration of basti. Initially honey and rock salt are mixed together in the beginning followed by addition of oil. This mixture is then thoroughly mixed .The finely wet grinded paste of prescribed medicinal plants is then mixed in it. The mixture is then again mixed throughoutly.The prescribed liquids such as *Kwatha (*decoction) are then added to it and the mixture is subjected to thorough churning to produce a homogeneous mixture.[5] The mixture thus acquires the physical state of emulsion. An emulsion is a mixture of two or more immiscible (unbendable) liquids. One liquid (the dispersed phase) is dispersed in the other (the continuous phase).

1. Role of Honey

It is recommended in the classics of Ayurveda that hot honey is harmful and never be taken. However in *Charak Samhita Kalpa Sthana*, hot honey is indicated to prescribe for *Vamana* Karma (emesis). In Basti Kalpana also, honey along with hot decoction are administered into the body It is considered as the best among the vehicles (catalyst), as it contains various substances in it, which denotes its drug (potency of the drug) Carrying Capacity.[6] It has properties like '*Yogavaahitwa*' by way of which it enhances the properties of substances with which it is processed.

Honey is a natural product with very complex chemical composition .It is composed primarily of fructose and glucose but also contains 4 to 5% fructooligosaccharides which serve as prebiotic agents .It contains more than 180 substances, including amino acids, vitamin ,minerals and enzymes. Honey has stimulative effect on colonic bacteria. It is involved in formation and inactivation of carcinogens in the gut lumen and may be altered in a positive way by the presence of colonic probiotic bacteria. It is natural emulsifying agent. Honey also helps easy elimination by its *Sukshma Guna*, helps the drug (potency of drug) to reach into the micro channels. Apart from these functions, it protects the mucous membrane from the untoward effect of irritating drugs in the *Basti Dravya*. In colon production of short-chainatty acids (SCFA) is produced by abundant bacterial fauna. Colonocytes can take SCFA up efficiently and in part utilizes them as nutritional sources. Both squamous stratified mucosa of rumen and columnar simple epithelium of intestine absorb readily SCFA. Passive diffusion of the unionized form across the cell membrane is currently admitted. In the lumen, the necessary protection of SCFA anions could come first from the hydration of CO2.SCFAs might play a key role in the treatment of the metabolic syndrome, bowel diseases and certain types of cancer.

2. Role of Saindhava Lavana (Rock Salt)

Salt in general are having properties like *Vishyandi, Sukshma, Tikshna* and *Vataghna*, it promotes the evacuation of bladder and rectum Owing to the sukshma (micro or extremely small) m property it helps the drug (potency of the drug) to rech the micro channels , *saindhava* (rock salt) mixed with honey is capable of liquefying the viscid Kapha and elimination . Similarly it may liquefy the morbid *Dosha –sanghata* and breaks it into smaller particles by virtue of its *Ushna* and *Tikshna* property respectively and thus helps their elimination. Apart from this, *Saindhava* (rock salt) destroyes the *Picchila, Bahula* and *Kashaya* properties of Madhu (honey), and makes close union with it to form a homogenious mixture It also has *Cheedan* property.It dissolves and expels Dosha from colon Thus it helps in absorption and bio purification process of Basti. Continuous churning of honey and rock salt increase homogenicity of the emulsion of the Basti material and reduction in the size of particles with the duration of the Basti Bhavana

3. Role of Sneha (Lipids)

It includes Ghruta,Taila(oil),Vasa,Majja(bone marrow) and each one is having its specific properties accordingly it produces beneficial effects, Sneha in general as vataghna, Mrudukara (produces softness in the channels

and tissues, in tern helps for easy elimination of waste substances) and removes the obstruction which is produced by the mala i.e., Malanam vibhakti sanghata. Owing to the Snigdha Guna, it produces smoothening of tissue and walls that helpsin easy elimination, by Sukshma guna it helps the drug (potency of the drug) to reach into the microchannels. Apart from these functions it protects the mucous membrane from the untoward effect of irritating drugs in the basti dravya.

In colon production of short chain fatty acids (SCFA) is produced by abundant bacterial fanna. Colonocytes can take SCFA up efficiently and in part utilize them as a nutritional sources Both squameous stratified mucosa of the rumen and coloumnar simpal epithelium of the intestine absorb radialy SCFA anions could come first from the hydration of the CO2. SCFA might be play a key role in the treatment of the metabolic syndrome, bowel disorders, and certain types of cancer .In clinical studies SCFA admistration positively influence the treatment of ulcerative colitis, Crohn's disease and anti biotic associated diarrhoea.

4.Role of kwatha

It si thadrava dravya (liquid part) usually the kashaya (decoction of herbal drugs) is used, but as per the need *Kshira* (milk), *Mamsarasa* (decoction of meat), Amlakai, Gomutra (Cow urine), Dadhi mastu (water of curd) etc. are also used in the place of decoction of herbal drugs oncce they are the main constituents of the Basti Dravya.

5.Role of kalka

It serves the function *of Utkleshana or doshashamana* or *samshamaa* depending upon its contents and it is selected accordingly .It gives required thickness to the basti material. Less quantity or absence of *kalka (*paste of herbs) makes the *basti dravya* thin which comes out easily after administration. Excess quantity of kalka makes the basti dravya thick difficult to administration and may not come out within the ideal expected time limit. Kalka dravya acts as catalyst agent which improves the potency of Basti.

Phenomenon Of Absorbtion Of The Basti-

The human colon nominal mucosal surface area of about 2000 cm^2 but in reality the total absorptive surface area is even greater because colonic crypt cells are capable of absorption as well as secretion. Drug absorption is determined by the drugs physiochemical properties, formulation and route of administration. In rectum drugs may cross cell membranes by passive diffusion, facilitated passive diffusion, active transport, or pinocytosis. Sometimes various globular proteins embedded in the matrix function as receptors and help transport molecules across the membrane.

In clinical study on pharmacokinetic of basti of Triphala *Tail Anuvasan and Triphala Niruha* in humans shows significant absorption of Gallic acid in blood which is an active ingredient of triphala as compared to oral group. On quantitative estimation of Gallic acid in all the samples of human Anuvasana , *Niruha* and oral group, concentration of Gallic acid is found highest in anuvasana group of 90 minuits after administrating *Triphala Niruha Basti.*

DISCUSSION

Pharmacodynamics of Basti

Basti acts through its Virya (Active principles of the drug)[7]Active principle is an ingredient of a drug that is actively involved as its therapeutic effect . *Nipata* (contact) and *Adhivasa* (inherent residing) are the two chief mode by which *Basti Virya* can affect the body as seen by the above mentioned explanation.

Action of Bastivirya by Nipata-

Basti administered in the pakwashaya affects the whole body by its Virya similarly as the sun in the sky affects the Bhurasa (water) though it is far away.[8] This example shows that the action of basti is not only dependent upon absorption of the active principle but also it affects the body as soon as these active principles comes in the contact with the *Pakwashaya* proving the action of *Basti Dravya* by Nipata

Action of Basti Dravya by Adhivasa-

When Basti is administered into the pakwashaya, its virya (probably active principle) is taken up by Samana Vaayu with the help of Apana Vaayu . Then it reaches other Vayuz also, and affects them by its action. It also keeps Pitta and Kapha in their proper places .It exerts its effect on Bhutaz(panchamahabhootas) which are similar to that Guna of Virya.The transport of Bastidravya is by *'Keedari kulya* Nyaya'which makes it spread all over the body by virtue of different Vaayus.

This quotation supports the theory of absorption of Basti active peoperties i.e. dependent upon guna which are the properties in the Dravya.[9]

Action of Basti through Enteric Nervous System (ENS)

This action can be explained in modern parlance by the direct action of active principles of drug on receptors in the gastrointestinal tract related to the enteric nervous system (ENS). ENS is the substantial group of neurons it is capable of Autonomous reflex without influence of CNS (central nervous system) so it is also known as second brain.[10] There are so many similarities between CNS and ENS regarding cellular structures, neuro peptide secretion and specific functions and recent studies shows that there is an influence of CNS and ENS on each other.[11]

Basti may act over the receptors of the ENS to stimulate the CNS causing the secretion of required hormones or other chemicals. Hence the effect of basti may also be associated with "Touch and Go Theory'' causing activation of ENS receptors. It is recognised that the enteric nervous system has the unique ability to mediate

reflex activity independently of input from the brain or the spinal cord.[12] This ability implies that the ENS contains sensory receptors, primary afferent neurons, interneurons and motor neurons The events that are controlled at least in part, by the ENS are multiple and include motor activity, secretion, absorption, blood flow and interaction with other organs such as gall bladder or pancreas.[13] The extensive regulatory activities of the ENS are made possible by the presence and abundance of different types of neurons within the wall of the gastro inteastinal tract. Morphological. electrophysiological, and pharmacological studies have revealed a substantial diversity of neurons within the ENS.[14] It produces a wide range of hormones and around 40 neurotransmittors of the same classes as those found in the brain. In fact, neurons in the gut are thought to generate as much dopamine as those in the head. Intriguingly, about 95 % of the serotonin present in the body at any time is in the ENS .Serotonin produced in the gut gets into the blood, where it is involved in repairing damaged cells in the in the liver and the lungs . It is also important for normal development of the heart, as well as regulating bone density by inhibiting bone formation.[15]

CONCLUSION

The composition of the enema (solid vs liquid nature of the suppository base) appears to be an important factor in the absorption process by determining the pattern of drug release. For a number of drugs the extent of rectal absorption has been reported to exceed oral values, which may reflect partial avoidance of hepatic first-pass metabolism after rectal delivery. ENS works in synergism with the CNS.Stimulation with the basti (either by chemo or mechano receptors) may lead to activation of concerned part of CNS which precipitates results accordingly

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