

Physio-Pharmacological aspects of *Guda Basti*

Review article

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Abstract

Amongst all the *Shodhan* and *Shaman* treatments of Ayurveda; *Basti* is one which can be used in all types of diseases and conditions. With proper combination of different drug it acts as anabolic as well as catabolic therapeutics, that's why it is called as half treatment. *Basti* is a medication given through rectum which is a part of G.I Tract hence enema is equated with *Basti*. When administration volume of enema exceeds 80-100ml as in *Basti* there is a possibility of migration of drugs in to the ascending colon and even up to the ileum. Hence pervading of *Basti* solution is most important consideration. G.I. tract from cecum to rectum is very much differing in anatomical as well as physiological point of view. So plant origin drugs given by this route shows different Physio-Pharmacological properties. *Basti* doesn't act by virtue of its drug mixture alone, beside drug mixture; left lateral position of patient, time of *Basti* administration related with food, mixture of *Madhu* and *Saindhav* play an important role. The pervading attributes for *Niruha* and *Anuvasan* are different. On the basis of this attributes Physio-Pharmacological aspects can be classified under Absorption and Excretion. The main aim of this article is to collect all references of *Basti*/Rectal root of drug administration from modern as well as *Ayurvedic* point of view and to explore the exact mechanism of action. In future *Niruha Basti* may be used as beneficial method for removal of the body waste products and *Anuvasan Basti* more nearer regarding the new nutritional root.

Keywords: *Basti*, Pervading Attribute, Physio-Pharmacological aspects, *Madhu*, *Saindhav*, *Niruha*, *Anuvasan*.

Introduction

Acharya Charaka described that *Basti* can be used as universal tool for all type of diseases and conditions (1). It shows broad spectrum and multidimensional aspect regarding effects. It can be used for *Karshan* (Catabolic) as well as for *Brimhana* (Anabolic) with

changes in the mixture of drugs (2). Change in Root of drug administration and target organ causes different action by the same drug i.e. *Madana phala* by oral root induces emesis while through rectal root it act as *Aasthapanopaga* (3). Drugs used in *Basti* are also used by oral root so these drugs through rectum definitely show different effects. Again an anatomical and physiological variation in small intestine and large intestine causes effect variation during absorption and transportation. These anatomical and physiological variations as well as some procedural aspects like position of patient, time of administration of *Basti* related with food, Properties of solution affects the pervading attributes (spreading/up to what extent

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does *Basti Dravya* goes) as volume of Enema solution exceeds 80-100ml, drugs reaches up to the ileum (4). Ultimately this makes an impact on Absorption and Excretion of *Basti*. So it is necessary to explore the Physio-Pharmacological aspect of *Basti*. The main aim of this article is to describe a hypothetical Physio-Pharmacological aspect based on relevant information available in modern science fulfilling Aurvedic requirement which can be applicable for *Basti Karma*.

Modern View

A] Anatomy of Large Intestine

The large intestine is about 1.5 m (5ft) in length and averages 6.5 cm (2.5 inches) in diameter. It extends from the ileum to the anus and is attached to posterior wall. Structurally the large intestine is divided into four principal regions i.e. cecum, colon, rectum and anal canal.

The opening from ileum into the large intestine is guarded by a fold of mucous membrane called ileocecal sphincter (valve). This structure drives materials into the large intestine. Hanging below the ileocecal valve is the cecum a blind pouch about 6 cm. (2.5 inches long).

The open end of cecum merges with a long tube called colon. The colon is divided into ascending, transverse, descending and sigmoid portion. The ascending colon ascends on the right side of abdomen, reaches under surface of liver, turns abruptly to left where it forms the right colic flexure/hepatic flexure. The colon continues across the abdomen to the left side as transverse colon. It curves beneath the lower end of spleen on the left side as left colic flexure and passes downward as descending colon. The sigmoid colon begins near the left iliac crest, projects inward to the midline and terminates at the rectum. The rectum is 20 cm long and lies anterior to sacrum and coccyx. The terminal 1 inch part is called anus (5).

The wall of large intestine differs from that small intestine in several aspects. The Mucosa consists of simple columnar epithelium with numerous goblet cells. No villi or permanent circular folds are found in the mucosa. The columnar cells functions primarily in water absorption whereas goblet cells secrete mucus that lubricates the colonic contents. The submucosa of large intestine is similar to that found in the rest of gastrointestinal tract. The muscularis consists of an external layer of circular muscles between which layer of nerve plexus (Aurbach's plexus) lies (6). Which regulates GI tract mobility and submucosal plexus regulates G.I. secretion (7).

B] Physiology of Large Intestine

1. Mechanical

The passage of chyme from ileum to cecum is regulated by ileocecal sphincter. The wall usually remains contracted so that passage of chyme into the cecum is usually slow process. Immediately after a meal, a gastroileal reflex intensifies peristalsis in the ileum and forces any chyme into cecum. The hormone gastrin also relaxes the sphincter (8).

As food passes through ileocecal sphincter it fills cecum and accumulates in ascending colon, Haustral churning is a characteristic process that occurs here. Houstra are bands of muscles. Contraction of one muscle and relaxes another food propulsion takes place (9).

2] Chemical

The last stage of digestion occurs through bacterial action, no enzymes are secreted by colon. These bacteria synthesize vitamin K, B and convert indigestible substances (e.g. Cellulose) or partially digested saccharides (e.g. Lactose) into absorbable short chain fatty acids and gases (Methane, H₂, CO₂) (10).

Mucous is secreted by the glands of large intestine but no enzyme secreted. Water is absorbed from chyme as it has

remained there 3 to 10 hours. So it becomes solid as a result of absorption (11).

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Pranvata the property of which is to takes food from mouth to *Koshtha* (12). This food undergoes process of *Saghata Bhedana* (Chymification) by *Sneha*, *Drava* (13) and *Kledak Kapha* (14) which makes food soft and mucilaginous. *Jatharagni* situated below the *Amashaya* is activated by *Samana Vayu* and digest the food (15). Which is taken in proper *Kaala*, proper *Maatra* along with *Ahar Parinam Kar Bhavas*. Formation of *Prasadbhuta Kapha* as a result of *Madhur Awastha Paka* and formation of *Prasadbhuta Pitta* is due to *Amla Awastha Paka*. Formation of *Vayu* takes place in *Pakvashaya* due to *Katu Rasa* of solid *Purisha* (16). This process is mother process generating *Vayu* which is pacified by *Niruha* and *Anuvasan*, ultimately conquering all *Vatavadhi* (17). Thus the *Prasad Bhaga* and *Mala Bhaga* formed after digestion. The *Saara Bhaga* absorbed by villi. While *Kitta Bhaga* excreted in the form of *Purish*, *Mutra* and *Sweda* (18).

Vyana Vayu through its *Vikshepana Kriya* distributes *Saara Bhaga* to different *Dhatu*s in the body (19).

Vishadyatva (cleanness) of *Pakvashaya* is maintained by *Katu Rasa* of *Purish* subsequently *Vayu*. So as to absorb the *Rasa* all functions should be in harmonious state but any *Nidana Kara Bhava* or etiological factors which vitiate *Vata*, affects *Vishadyatva* of *Pakvashaya*, subsequently increases *Khara Guna*.

Increase in *Vishadyatva* and *Khara Guna* causes various *Vatavyadhis* (20).

Purishdhara Kala and *Asthidhara Kala* likewise *Pittadhara* and *Majjadhara Kala* are interrelated (21).

Discussion

As *Basti* through *Guda* is an excellent way to avoid unpleasant test of *Bastidravaya* and to avoid unnecessary

interference of food to bypass the stages of *Madhura* and *Amla Awastha paka*, there are three main aspects to be evaluates with the help of Aurvedic and Modern review.

These are as follows,

1. Pervading Attribute of *Basti Dravya* (Up to what extent does the *Basti Dravya* goes into colon)
2. Excretion Phenomenon.
3. Absorption Phenomenon.

Pervading Attribute of Basti Dravya

A. According to *Acharya Basti Dravya* expels out stool and vitiated *Dosha* along with oil, from Umbilical region, both lumbar region, Hypogastric region [Fig. 1], both Inguinal region that means *Basti Dravya* goes up to the small intestine but this pervading attribute is for *Niruha* or *Anuvasana*, is not clear (22) but according to *Acharya Jejjat Anuvasan Basti* pervade up to *Grahani* i.e. small intestine (23).

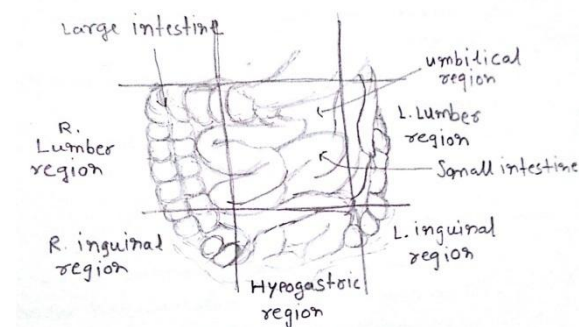


Fig. 1 Schematic Illustration of Abdominal Region

B. *Acharya* has advised to give *Anuvasan Basti* after taking food (24). From modern physiology we have reference that gastroileal reflex arise and relaxes the ileocecal sphincter only after taking food (25). For digestion, fat requires enzymes and bile micelles present in intestinal flora, but small portion of short and medium chain fatty acids, are absorbed directly into the portal blood as short chain fatty acids are more water soluble and absorbed by large intestine along with water absorption (26). As there is no digestion of fat takes place in large intestine and *Anuvasan Basti* comprise of fat portion. Only after taking

food *Anuvasan Basti* goes up to the small intestine.

C. a) Materials introduced by Enema, in some instances pass through the walls into the ileum; such incompetence may permit the Enema fluid to reach the duodenum (27).

b) The possibility of materials from even the lower bowel, reaching the mouth is strongly suggested by the fact that lycopodium spores introduced into the colon by Enema have been recovered some hours later from washing of stomach (28).

As we know administration of enema volume greater than 80-100ml migration of drugs into the ascending colon and even the ileum is possible (29). Hence we can say that medicated oil of *Anuvasan Basti* goes up to the small intestine only after taking food whereas *Niruha* goes up to the cecum although some material of *Niruha* can escape to duodenum and mouth but devoid of any physiological importance.

Excretion Phenomenon

Vata takes part in integration and disintegration process of *Vinmutradi Ashayas* and *Basti* regulates the integration and disintegration process (30) that means vitiated *Vata* completely regulated by *Basti*. By critically evaluating the principle described by *Sushrut* (31) given *Basti* generally comes out with *Mala* and *Dosha* but the *Virya* of *Basti Dravya* spreads throughout the body with the help of *Vayu* i.e. *Apana*, *Udana*, *Vyana* etc. Most of the work of different kind of *Vayu* described shows resemblance with the function of autonomic nervous system.

According to the modern science autonomic nervous system is mainly concerned with regulation of circulation and internal organs. As the name implies, most activities of the ANS are not subject to voluntary control (32).

Thus *Virya* of *Basti Dravya* spread through autonomic nervous system and expel out vitiated *Dosha* from the body. This is especially for *Niruha Basti*, where absorption of *Basti Dravya* is not expected. So now we can speculate that work done by *Basti* is achieved through the activation of autonomic nervous system.

Stimulation of autonomic nervous system could be the possible mechanism here.

From modern physiology we have a reference that the wall of rectum possesses the stretch receptors. Whenever stool enters into the rectum, distention of rectal wall causes initiation of defecation reflex (33). At the same time release of catecholamines occurs during visceral distention and probably this also participate in pressor response i.e. stretch receptor response which is also called as Enteric Nervous System (34).

Interesting point is that by inserting *Basti Netra* into the rectum, the same phenomenon happens as described above which causes initiation of defecation reflex due to visceral distension and pressure response (35).

It is known that due to stimulation of receptors/ pressure receptors increase Na^+ conductance/inward rush of Na^+ occurs through the membrane of unmyelinated nerve terminals. The resultant influx of Na^+ causes the development of generator potential. Na^+ depletion diminishes the generator potential in pacinian corpuscles in nerve endings. Perfusion with Na^+ free solution made isotonic with sucrose does not abolish the generator potential but only reduces it to about 10% of the control value. Thus such type of solution sustain generator potential which initiate permeability to Na^+ and other ions as well (36).

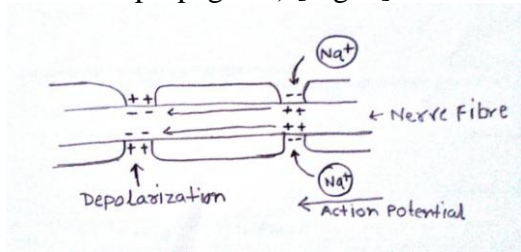
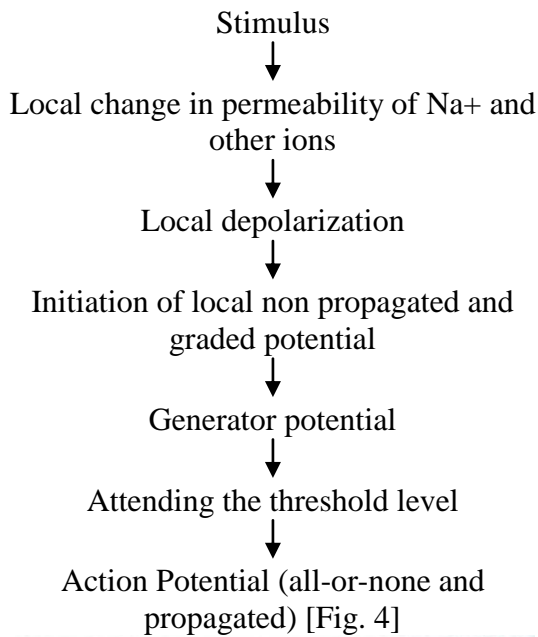


Fig. 4 Schematic Illustration of Action Potential Propagation

Coming to pretext that *Basti Dravya* does contains *Madhu* (Honey) and *Saindhav*. *Madhu* contains sucrose as well as formic acid (37) while *saindhav* is made up of NaCl and other ions (38) which fulfill the requirement for sustaining generator action potential.

Hence mixture of *Madhu* and *Saindhav* is beneficial for sustaining action potential which follows stimulation of autonomic nervous system.

Parasympathetic stimulation in general increases the overall degree of activity of gastro-intestinal tract by promoting peristalsis and relaxing the sphincters, thus allowing rapid propulsion of contents along the tract. This propulsive effect associated with simultaneous increases in rate of secretion by many of the gastro-intestinal glands (39). Secretion

of water and electrolytes, mucus increases in response to the irritation or stimulation of local nerve plexus (40).

Formic acid present in *Madhu* causes irritation and stimulation of local nerve plexus. In this process of secretion of heavy metals like Bismuth, Mercury, Arsenic are excreted through the large gut. The diffusible substances present in the bolus may be excreted if the concentration of these substances in the colon is lower than the blood. Due to the basis of which, this part of the intestine may be used as artificial kidney for removal of the body waste product whose kidney is in trouble provided the concentration of these substances in the intestine is kept lowered by withdrawing them from it constantly. When they are injected subcutaneously they appear in the feces (41).

Hence we can say that with different combination of plants origin drugs *Basti* expels out *Dosha* from the body by the same phenomenon described above (42).

Absorption Phenomenon:

Absorption is the process by which the end products or drug molecules pass through epithelium and enter the blood stream. Diffusion, Hydrostatic pressure, Osmotic pressure, Adsorption, Hydrotrophy, Passive and Active transport are the main factors involved into the absorption process (43). Brush border epithelium i.e. microvilli is the chief absorption organ (44). [Fig.3]

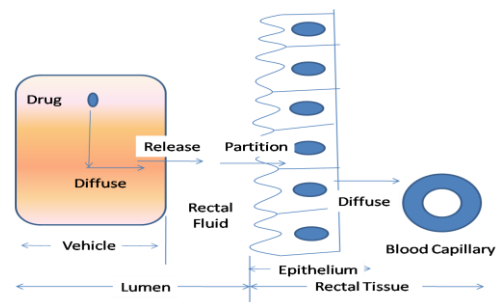


Fig.3 Drug Movements in Rectum

The structural features of the mucous membrane on the luminal surfaces in the colon and rectum do not differ from those in the small intestine; however, microvilli are absent in the large intestine including the rectum. From this anatomical feature, we cannot conclude that the large intestine and the rectum are effective organs for drug absorption. If volume of solution is less than 80-100ml then lipid soluble drugs can be absorbed via middle and inferior rectal artery reaches systemic circulation avoiding liver metabolism (45) as in Matra Basti but when volume increases above 80ml drugs goes up to the ileum.

We known the process of absorption from small intestine by villi but in absence of proper enzymes and different anatomy some drugs can be absorbed through large intestine as follows (46),

1. Water absorption and formation of stool is one of the chief function of large intestine. About 60% to 80% of water is absorbed here.
2. Saline: Normal saline is freely absorbed.
3. Glucose: Isolated large intestine absorbs glucose at the rate of 6gm./hour. 5% glucose solution is suitable for administration per rectum in the human subject.
4. Amino acids are also absorbed.
5. Certain drugs like anesthetics are absorbed.

Even though there are no enzymes for lipid metabolism in large intestine short chain fatty acids can be easily diffusible through large intestine (47). Oil in Basti chiefly comprises of fatty acids and Madana phala contains saponin which acts as absorption and non-ionic surfactants (48). These absorption enhancer facilitates drug absorption.

Only by changing time of administration and *Dravya* of *Basti* we can facilitate the rectal absorption. In this context left lateral position and *Basti* administered after food is very helpful. Left lateral position gives unobstructed proper passages for *Basti Dravya* to reach up to cecum. While time of administration after food opens ileocecal sphincter and gives chance to large volume of *Basti* oil to reach up to the small intestine where lipid enzymes acts upon lipid and lipid soluble drugs.

Conclusion:

Thus we can conclude that Ayurvedic concept of *Basti* is most scientific. For proper benefits of *Basti* only drugs are not sufficient, for proper passage and pervading attribute up to the small intestine, time of *Basti* administration is very important i.e. after food for *Anuvasan* and without food before hunger for *Niruha*.

With proper combination of *Madhu* and *Saindhav* it initiate generator action potential and sustain it for stimulation of autonomous nervous system after that it acts by absorption phenomenon or excretory phenomenon on the basis of mixture of plants origin drugs.

In future *Niruha Basti* may be used as beneficial method for removal of the body waste products and *Anuvasan Basti* more nearer regarding the new nutritional root.

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