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## A Critical Review of *Samana Vayu* in the Modern Perspective

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### ABSTRACT

*Ayurveda* is one of the ancient and fruitful science for human beings. Science of *Ayurveda* is based on *tridosha* theory. *Vata* one among three *doshas* play important and major role in both health and diseased condition. *Vata dosha* has five subdivisions namely *Prana*, *Udana*, *Samana*, *Vyana* and *Apana*. Among these five *doshas*, *Saman vayu* is present near *jatharagni* (digestive fire), and travels all over the gastrointestinal tract (GIT). It stimulates the *Agni* for digestion and helps in division of essence and waste product, movement of gastrointestinal products. With the help of *Pranavayu* it receives food into digestive tract and with *Apana vayu* helps in removal of waste product from the body. All the functions of *samanavayu* can be compared with physiological functions of anatomical structure of contemporary modern medical science. Basically, Enteric nervous system (ENS) and sympathetic and parasympathetic supply of Autonomic nervous system (ANS) to GIT, diet like protein and fatty diet helps in stimulation of *Agni* and leads to digestion and movement of GI products, absorption and other functions. It might be compared with *Samanvayu*. Very few works have been accomplished on conceptual features of *vata*. In this article an attempt has been made to correlate the physiological activity of *saman vayu* with modern medical science. For this study, the basic materials have been collected from the *Ayurvedic* classics with the available commentaries, as well as Text books of contemporary modern medical science have been referred for better understanding of the concept and its comparison with contemporary science.

### KEYWORDS

*Samanvayu*, *Pranavayu*, *Apanavayu*, ENS, ANS



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## INTRODUCTION

In this modern era people are too busy to achieve their goal. To achieve the goal a person has to be in healthy status. A physician can make a person healthy after in depth understanding of physiology of the body. The purpose of *Ayurveda* science is to maintain the health of the healthy and cure disease of diseased. In *Ayurveda* health is a state where *dosha*, *agni*, *dhatu*s, waste products, all physiological functions should be in homeostatic state and soul, sense organ and mind should be in a state of total wellbeing<sup>1</sup>. *Vata dosha* perform various functions like; in its normal state maintains the function of organs and organ system. *Vata* is the initiating and controlling factor of human body and also responsible for all type of movements<sup>2</sup>. *Vata* is the controller and impeller of all mental functions, and the employer of all sensory faculties. *vata* joins the body tissues and brings compactness to the body, promotes speech, origin of sound and touch sensation, *vata* is the root cause of auditory and tactile sense faculties, the causative factor of pleasure and courage, stimulates the digestive fire, and helps in the absorption of the *doṣhas* and ejection of the excretory products. *Vata* travels through all gross and subtle channels, gives the shape of embryo and is the indicator of continuity of

life<sup>3</sup>. *Vatadosha* has been divided into five types on the basis of location namely *prana*, *udana*, *saman*, *vyana* and *apana*. All these five *vatadoshas* have their different site as well as different functions. Among the five types of *vata*, *Saman vayu* has various functions which act at different level. It also performs its function with the help of *prana vayu*, *vyana vayu* and *apana vayu*. These *vayus* proper cooperate and coordinate to each other while performing physiological functions. So there is a need of proper understanding the functions in modern prospective. It cannot be represented by a single entity at all the time because *Ayurveda* is the science based on the concept of functional understanding. There is no specific correlation of *Samana vayu* with other *vayus* is mentioned in *Ayurvedic* literature in terms of supporting modern literature. It seems to be a problem found in student life, particularly first year of Bachelor of *Ayurvedic* Medicine and Surgery to understand about the concept of *Samana vayu*. Increased demand of *Ayurveda* science in the present scenario is required to understand the depth of *Ayurvedic* principles on criterion of modern medical science in an easy mode. In this review we are trying to identify anatomical structures based on its physiological functions retrospectively described under the function of *Samana vayu*.

## Site and Functions of *Saman Vayu* by

Different *Acharya*: Table No.-1

**Table 1** Site and function of samanvayu by different acharya

	<b>Charak Samhita<sup>4</sup></b>	<b>Sushrut Samhita<sup>5</sup></b>	<b>Astanga Hridaya<sup>6</sup></b>	<b>Astanga Samgraha<sup>7</sup></b>
<b>Sthan (Location)</b>	Present in channels of sweat, humors and water and lateral to the seat of <i>agni</i> (digestive fire).	It moves in the <i>aamashaya</i> and <i>pakvashaya</i> associating with <i>agni</i> (digestive power).	Present near <i>jatharagni</i> (digestive fire) and it travels all over the <i>kostha</i> (GIT).	Present near the digestive fire, moves inside the large intestine, stomach and small intestine, channels of the <i>doshas</i> , <i>malas</i> (waste), <i>sukra</i> (reproductive tissue of male), <i>artava</i> (menstrual fluid), and <i>ovum</i> (the reproductive tissue of female), and <i>ambu</i> (body fluid).
<b>Karma (Function)</b>	Give up strength to the ( <i>agni</i> ) digestive fire.	It digests the food and separates its product (essence and waste of food after digestion).	It receives the food into the digestive tract, digests it, separates the essence from excrement and liberates it to its respective pathways.	Kindle the digestive fire, Support the <i>srotas</i> in their functions, retaining of food in the alimentary tract, digestion, separation of essence and waste and moving in the waste product downwards.

- The term *Samana* means “*samanthadkosthesamyaksamamvaaaaniti, itisamanah*”, which denotes prevalent all around or which equalises into one whatever we eat. In *Yogarnava*, colour of *Samana vayu* has been stated as “*goksheerasadrishakarah*” which means that it resembles with the color of cow milk<sup>8</sup>.

- Samana vayu* helps in intake of food into GIT with the help of *Prana vayu*. It helps in movement of GI products by the contraction of muscles with the help of *Vyana vayu*. It also helps in movement of waste products with their *Srotas* by the help of *Apana vayu*.

- When *samana vata* is in its normal seat *jatharagni* is considered as *samagni*.

When it becomes *vimargaami* it causes *vishamagni*, when it is associated with *pitta* it causes *tikshnagni*, when it is associated with *kapha*, it causes *manadagni*.

- When *Saman vayu* is aggravated it gives rise to disease like abdominal tumors, weakness of digestion, diarrhea.

### MODERN ASPECT:

#### ANNAM GRIHNATI:

It means receiving and withholding the food in gastrointestinal tract. *Anna grahan* is the function of *Prana vayu*. *Samana vayu* helps in receiving food by the coordinative function of *Prana vayu*.

Deglutition is a complicated mechanism. It involves 3 stages.

- Voluntary stage of swallowing:** It is the voluntary stage. The pressure of

tongue upward and backward against the palate causes squeezing of food into pharynx posteriorly. Twelfth cranial nerve (hypoglossal nerve) is supplied to the muscle of tongue.

2. **Involuntary pharyngeal stage of swallowing:** After squeezing of bolus to posterior mouth and pharynx, the epithelial swallowing receptor areas around the pharynx are stimulated. Then the impulses are transmitted through the sensory portions of trigeminal and glossopharyngeal nerve into medulla oblongata. The motor impulse from swallowing center to pharynx and esophagus are transmitted by 5<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup> cranial nerve.

3. **Esophageal stage of swallowing:** The esophagus functions primarily to conduct food rapidly from the pharynx to stomach. It exhibit two types of peristaltic movement i.e. propulsive and mixing movements. These peristaltic waves are initiated and controlled by intrinsic neuronal circuits in the myentric nervous system<sup>9</sup>.

#### **ANNAM PACHATI:**

*Anna pachana* means digestion of food and digestion and metabolism of food is the chief function of *agni*. Function of *samana vayu* is to stimulate the *agni* for digestion and metabolism. So all factors which stimulate the *agni* for digestion and

metabolism comes under the *annam pachati* function of *saman vayu*.

#### **ENTERIC NERVOUS SYSTEM:**

The enteric nervous system is found in gastro intestinal tract, lies in the wall of gut beginning from the esophagus to anus. There are 100 million neurons present in enteric nervous system. It is responsible for the control of gastrointestinal movement and secretion. It is composed of two plexus. Those are auerbach's plexus or myentric plexus and submucous plexus or meissner's plexus. Auerbach's plexus is an outer plexus present in between longitudinal and circular muscle fiber. It helps in controlling of gastrointestinal movement. Submucosal plexus is present in the submucosa. It helps in controlling of gastrointestinal secretion and local blood flow. The extrinsic sympathetic and parasympathetic fibers of autonomic nervous system connect to myentric and submucosal plexus. Although ENS can function independently, stimulation of both the system enhances or inhibits the gastrointestinal function respectively<sup>10</sup>.

The sensory nerve fibers from intestinal epithelium send afferent fibers to both the plexus, prevertebral ganglia of sympathetic nervous system, to the spinal cord and in the vagus nerves all the way to the brain stem. Myentric plexus helps in control of muscle activity along the length of gut. When this

plexus is stimulated it increases the tone of the gut wall, intensity of rhythmic contraction, velocity of conduction of excitatory waves along the gut wall and cause rapid movement. Some of the neuron of myentric plexus is inhibitory in actions because of inhibitory transmitter vasoactive intestinal polypeptide secreted by some of its neurons. These signals inhibit the pyloric sphincter which controls the emptying of stomach into the duodenum and sphincter of ileocecal valve which controls emptying from small intestine to cecum. The submucosal plexus helps in controlling the function within the inner wall of each minute segment of the intestine for example to control local intestinal secretion, absorption and contraction of the submucosal muscle<sup>11</sup>.

#### **AUTONOMIC CONTROL OF GASTROINTESTINAL TRACT:**

The cranial parasympathetic nerve fibers provide innervation to the esophagus, stomach, lungs, liver, gall bladder, heart, kidney, pancreas, entire small intestine and proximal half of the colon, upper part of ureter. The sacral parasympathetic fibers supply to the descending colon, rectum, urinary bladder and lower portion of ureter. The post ganglionic neurons of gastrointestinal parasympathetic system are present mainly on the myentric and

submucosal plexus. Stimulation of these nerves enhances the activity of ENS<sup>12</sup>.

The sympathetic fibers of gastrointestinal tract originate in the spinal cord between T-7 to T-11 segment. Most of the preganglionic fibers leaves the cord the enter into the sympathetic chain some preganglionic nerve fibers pass on without synapsing through the chain to pre vertebral ganglia such as celiac ganglia and mesenteric ganglia then postganglionic nerves supply to all parts of the gut. Stimulation of sympathetic nerve fibers inhibits the action of gastrointestinal tract. It performs its function by direct effect of secreted norepinephrine to inhibit the intestinal tract smooth muscle or by inhibitory effect of NE on the neuron of ENS<sup>13</sup>.

#### **FACTORS THAT STIMULATE FOR DIGESTION<sup>14</sup>:**

There are various factors which stimulate the digestive enzyme for their digestive action which are given below. TABLE-2

#### **ANNAM VIVECHAYATI:**

It means separation of essence and waste products of digested food and absorption of essence part of food, water, minerals etc.

The watery part of chyme is absorbed by the process of osmosis. Absorption of sodium is by active transport of sodium from inside

**Table 2** Factors that Stimulate for Digestion

STIMULI FOR SECRETION	SITE OF SECRETION	HORMONE	ACTION
Protein diet, distention of stomach, gastrin releasing peptide	G cells of antrum, duodenum, jejunum	Gastrin	Gastric acid secretion, Growth of gastric mucosa
peptone or proteoses, fatty acid and monoglyceride	'I' cell in mucosa of duodenum and jejunum	Cholecystokinin(CCK)	Stimulate pancreatic enzyme secretion, Pancreatic bicarbonate secretion, Gall bladder contraction, Inhibit gastric emptying
Acidic gastric juice, fatty diet	S cell of duodenum, Jejunum, Ileum	Secretin	Stimulate pepsin secretion, pancreatic bicarbonate secretion, biliary bicarbonate secretion and inhibit gastric acid secretion.
Fatty acid, amino acid, and carbohydrate	K cell of duodenum and jejunum	Gastric inhibitory peptide (GIP)	Stimulates insulin secretion and inhibits gastric acid secretion
Fatty diet, acid, nerves	M cell of duodenum and jejunum	Motilin	stimulate gastric and intestinal motility
Histamine	Parietal cell	HCL	Kills ingested bacteria, provide acidic medium for digestion, converts pepsinogen into pepsin
HCL	Peptic cell	Pepsinogen	Converts into pepsin for protein digestion
Emotional factors	Peptic and Oxyntic cell	Pepsinogen and HCL	Digestion of protein
Chyme in upper portion of small intestine	Pancreatic cell	Pancreatic juice	Digestion of protein, carbohydrate and fat
Enterokinase	Pancreatic cell	Trypsinogen	Protein digestion
Acetylcholine, Cholecystokinin	Pancreatic cell	Pancreatic enzyme	Digestion of protein, carbohydrate and fat

epithelial cells. Absorption of glucose is done by sodium glucose cotransporter, absorption of protein by sodium amino acid co transporter, absorption of calcium by parathyroid hormone. In dehydrated person aldosterone helps in sodium retention and corresponding chloride ion and water<sup>15</sup>. Bile micelles helps in absorption of digested fat i.e. monoglycerides and fatty acids.

### MUNCHATI:

It means expulsion of waste products i.e. fecal matters and urine. Elimination of

waste product is the function of *Apana vayu*. *Samanavayu* initiates *Apana vayu* to execute its function for the expulsion of waste product. This means coordinated functions of both *Apana vayu* and *Samana vayu* helps in elimination of waste material from the body. *Samana vayu* initiates both defecation and micturition reflex.

When a mass movement forces feces into rectum, desire for defecation occurs immediately. Two type of reflex is seen. One is an intrinsic reflex mediated by local ENS in the rectal wall. When feces enter

into the rectum, there is distention of rectal wall. Sensory signals are initiated through myentric plexus and causes peristalsis from descending colon to sigmoid and rectum. These waves cause the relaxation of internal sphincter. At the same time if the external anal sphincter is open defecation occurs. The other defecation reflex is initiated by parasympathetic nervous system. After entering of fecal matter into the rectum, the nerve endings in the rectum are stimulated then signal transmitted to the spinal cord. Reflex signal via pelvic nerve goes to descending colon, sigmoid and rectum. These parasympathetic signals travel in the pelvic nerve and greatly intensify peristalsis and relax the internal anal sphincter. At the same time if external anal sphincter is voluntarily relaxed defecation occurs<sup>16</sup>. Micturition reflex is caused by stretch reflex. When bladder begins to fill urine at higher pressure, sensory stretch receptors in the bladder wall are initiated to send signals to the sacral segment of cord through pelvic nerve. Then it reflexively back again to bladder through the parasympathetic nerve fibers and causes micturition<sup>17</sup>.

## DISCUSSION

Basically *Vata*, *Pitta*, *Kapha* constitute three regulatory systems i.e. nervous, endocrine and immune system respectively

of all living systems. Among *tridoshas* the supremacy of *Vata* is explained by all our *Acharyas*. *Vata* is the natural pacemaker from where all the activities are initiated and controlled. It is the basic humoral element which controls all the function of the body. Among the five type of *vata*, *Samanavayu* is located near *jathargani* and stimulate the *agnifor* digestion. *Pranavata* is located in *murdha*(head) and performs functions such as *sthivana* (spitting), *ksavathu* (sneezing), *udgara*(belching), *nisvasa* (respiration), *annapravesha* (deglutination). *Vyanavayu* has fast movement and spreads all over the body and is responsible for movement, contraction and relaxation of muscle, opening and closure of eyelid. *Apana* resides in *pakvadhana* (large intestine) eliminates *samirana* (flatus), *sakrit*(faeces), *mutra* (urine), *sukra*(semen), *garbha* (fetus), *artava* (menstrual fluid). *Samanavayu* also helps in initiation of ingestion of food, stimulation of digestive secretion, absorption of essence part, gastrointestinal motility, separation of essence and waste product, initiation of elimination of waste product through *srotas*. These functions of *samana vayu* are performed through the combined function of *prana*, *vyana*, *apana vayu* and *pachaka pitta*. It helps in ingestion of food to esophagus by the coordinative function of

*prana vayu*. It helps in gastrointestinal motility by contraction and relaxation of the muscle which is the function of *vyana vayu*. It helps in digestion of food by the coordinative function of *pachaka pitta*. It helps in expulsion of waste material by the coordinative function of *apana vayu*.

From the above details the functions of *Samana vayu*, described by *acharyas* can be compared with the physiological functions of 12<sup>th</sup> cranial nerve which control the movement of hypoglossal muscle, swallowing center of medulla, 5<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup> cranial nerve, peristaltic movement of GIT controlled by myenteric plexus of ENS, all stimulating factors that stimulate the secretion of digestive enzyme, bile micelles, sodium glucose co transporter, sodium amino acid co transporter, sodium-hydrogen ion exchange, simple process of diffusion like osmosis, active absorption, some hormones like aldosterone, and parathormone, stretch reflex and parasympathetic part of ANS can be compared with the function of *samanavayu*.

## CONCLUSION

Function of *Samanavayu* varies by different *Acharya*. It is primarily responsible for stimulation of *agni* and leads to digestion, absorption, separation of essence and waste material. Its functions can be interrelated

with different structures at cellular level to organism level as *Vata dosha* is involved in all type of systemic activity. It can be partially correlated with enteric nervous system, Sympathetic and parasympathetic supply of autonomic nervous system. It maintains the homeostasis by stimulating and regulating the digestive power or the digestive system. There is a need of further research to evaluate in detail of all other *Vata dosha* for the betterment of mankind.

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