



# Analysis Of Aaharpaka Concept Of Ayurveda

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Ayurveda is the oldest life science. Ayurveda believes that our bodies, like all universal substances, are made up of Pancha Mahabuta (the five basic elements). In this Panchabhautika Sharira, various processes are continuously going on leading to the loss of various elements. To replace it, you need to consume appropriate ahara (food). Acharya Charaka states that the body is the result of food and Agni (the element responsible for digestion) plays an important role in the proper digestion and metabolism of Akhara (food).

Ayurveda's Ahara pak also indicates relevance to contemporary texts. This hypothesis emerged millennia ago after extensive research that has confirmed its scientific status today.

## INTRODUCTION

The Ayurvedic hypothesis of the Sharira (body) is unique and is based on a pragmatic and scientific approach. According to Ayurvedic methodology, like all universal substances, our bodies are also formed by Panmahabhutas (Sarvam dravyam Panchabhautikam). In this panchabhautika sharira, various metabolic processes occur continuously leading to the loss of various elements. To replace this, you need to eat a proper diet. Acharya Charaka says that the body is the result of Akhara (food). Agni (fire) plays an important role in the proper digestion and metabolism of ahara. For the metabolism of different types of elements, Agni works in 13 different forms. To understand the concept of Ahara Pak in Ayurveda, you need to know Agni's role in digestion. Consumed food containing all elements is first digested in Amashaya (stomach) by the action of Jataragni. After this initial digestion and related metabolic processes, specific elements are metabolized by specific Agni. All five Mahabuta-related elements are individually metabolized by the associated Agni known as Butani. The formation of a dhatus (organization) is possible only through the maturation of the basic elements by a certain type of Agni, i.e. Dhatvagni.

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Metabolic process (*Vipaka-Prakriya*) occurring after consumption of diet leads to formation of two parts – *Prasada* (pure) and *kitta* (excretory part). The *Doshas* and *Dhatus*, etc., get nourished by *Prasada* part (nutrients). *Kitta* part (metabolic waste) is to be excreted from the body in any form. The concept of *Aharapaka* in Ayurveda provides an extensive field of research and scientific status in the present scenario [1].

## AIMS AND OBJECTIVES

1. To emphasize and discuss the concept of *Aharapaka* in various Ayurveda classical literatures.
2. To evaluate the process of digestion and metabolism in Ayurveda and modern texts.

## MATERIALS AND METHODS

This article is based on a review of various classical Ayurvedic texts. Gathered material related to *Aharapaka*, *Agni* and other related topics. For a complete and deep understanding of Ayurveda's concept of *Aharapaka*,

references were collected, analyzed and discussed.

The main Ayurvedic texts used in this study are Annotated Charaka Samhita, Shushruta Samhita, and Astang Hridaya. For research, I collected information about the contemporary medical literature and various sites.

### Conceptual Study

#### *Importance of Aahara in Ayurveda*

*Aahara* (food) has been given the prime importance since Vedic period. It is considered as *Brahma* in Upanishad, *Mahabhaishajya* in *Kashyapa Samhita* and one among the *Trayaupstambha* by Acharya Charaka [2].

Food helps in sustenance of life of living beings. All living beings in the world require food. Complexion, clearness of mind, good voice, longevity, understanding, ease and pleasure satisfaction (contentedness), growth, strength and intelligence are all dependent upon *Aahara* [3].

Acharya Charaka emphasizes importance of *Aahara*. *Sharira* (body) is the outcome of food. Even so, disease is the outcome of food. The distinction between ease and disease arises on account of wholesome nutrition or the lack of it respectively [4].

*Aahara* sustains and supports the *Deha-Dhatus* (tissue elements), *Ojas* (the factor of resistance to disease and decay), *Bala* (strength or capacity to perform physical work) and *Varna* (complexion) among people. *Aahara* depends upon *Agni* to contribute to the nourishment of the body. It is obvious that the body elements or *Sharira Dhatus* cannot be nourished and developed when food is not properly digested by *Agni* [5, 6].

The key to health and disease does not lie in the application of drugs or chemical or special therapies but in the prime factors on which our life and vitality is based. The *Aahara* enhances vitality, strength and makes the body sturdy. *Aahara* increases enthusiasm, memory, *Agni*, *Ayu*, *Teja* (luster) and *Ojas*. Consumption of pure food, i.e., *Satvika Ahara* makes the mind clear. When mind is devoid of blemishes, memory power enhances [7–9].

## ***Agni and Pitta***

To understand the concept of digestion and metabolism in Ayurveda we must first understand the concept of *Agni* and *Pitta* (one of the three bodily *doshas* responsible for digestion and metabolism) in *Sharira*.

There is no fundamental difference in physical and biological *Agni* except that the latter is associated with living organism. The effect of *Agni* at physiochemical level is decomposition, disintegration and acceleration of various chemical reactions occurring in nature. Similarly, the main function of *Agni* in the body is to breakdown or to disintegrate the food in its simplest possible components for absorption and utilization. Technically, these functions are termed as digestion and metabolism.

The concept of biological *Agni* has been described in *Charak Samhita* in two references:

### **(a) *Agni* (b) *Pitta***

The functions attributed as *Dahana*, *Pachana*, etc., of *Agni* correspond to the functions performed by varieties of biological substances known as enzymes [10].

It is the *Agni* alone that located in *Pitta*, gives rise to beneficial or harmful consequences, according as it is normal or abnormal. The concept of *Pachak Pitta* (*Kosthagni*) pointed to some internal secretions or secretions secreted by the *Agnidharakala*, in the *Grahani* (corresponding to the mucosal glands of the duodenum) [11,12].

### ***Systemic Control of Jatharagni on Other Agnis and Pittas***

The first ruk of *Rigveda* starts with “*aagni meelee purohitam*” which means *Agni* is *purohita*, here *purohita* means who leads ahead, *pura* also means body, *Agni* is the protector of the body. In *Ayurvedic* texts, lots of importance has been given to *Agni*. One of the eight branches of *Ayurveda* called *Kayachikitsa* itself is equated with *Agni* maintenance ((*kayasa antaragni chikitsa kayachikitsa*) [13].

Chakrapani Dutta enumerates 13 *Agnis* among which *Jatharagni* plays important role in regulation of five *Bhutagnis* and seven *Dhatwagnis*.

*Dehagni* or *Jathagagni* is the main principle substance responsible for disease and health. It is responsible for longevity, complexion, strength, health, enthusiasm, well built, luster, immunity (*ojas*), *Tejas* (*luster*), other *Agnis* (*bhutagni* and *dhatwagni*) and other vital functions are all dependent on *Jatharagni*. Healthy state of body and diseased condition is entirely dependent on *Agni* [14, 15].

*Aahara* (food) nourishes *Deha Dhatus* (tissue elements of the body), *Ojus* provides strength and complexion. But in effect, it is the *Agni* (enzymes) that plays a vital role in this connection because tissue elements like *Rasa*, etc., cannot even originate from undigested food particles [16].

### ***Process of Digestion (Paka Prakriya)***

According to Acharya Charak *Prana Vayu* (one type of *Vata dosha* responsible for respiration and swallowing) with its power of attraction, draws the ingested food into the *Kostha* (alimentary tract). This food gets softened by the unctuous substance after which it gets split into small particles by the liquid (saliva). Thereafter, the *Agni* (enzymes) located in the *Udara* (stomach) gets stimulated by *Samana Vayu* (one type of *Vata dosha*, performs function like receiving, digestion and division of food). This *Agni*

(enzymes) stimulated by *Vayu*, helps in the digestion of food of appropriate quantity taken in required quantity and in right time for promotion of longevity.

As the fire placed below helps in the cooking of food namely rice and water kept in a vessel placed there on, so does the *Agni* (enzymes) helps in the digestion of food located in the *ashaya* (*amashaya*), i.e., stomach for production of *Rasa* (chyle) and *Mala* (waste product) [16].

*Jatharagni paka*, i.e., gastrointestinal digestion of food has been described as *Avasthapaka* or the change in the state or form of food substance in the *Amashaya and Pakwasaya* in the course of digestive process. Two phases of this *paka*, the *prapaka and vipaka* have been envisaged. The term “*Prapaka*” has been defined by Chakrapani Dutta as *Pratham paka* or the first change. He on the other hand has defined the term “*Vipaka*” as changes which the food has undergone. *Prathampaka* is again subjected to further changes under the influence of *Jatharagni* [17].

### ***Avasthapaka (Prapaka) – Primary Digestion***

**The Madhur Bhava of Avasthapaka in Adho-Amashaya:** *Prapaka* phase of digestion of food stuff ingested commences from the time the food is introduced into the mouth. This aspect of digestion in the upper portion of *Urdhwa amashaya* is comprehended by *Madhura bhava*. The process of digestion, especially the fraction of it commences in the mouth, under the influence of *Bodhaka Kapha* (one of five types of *Kapha*, responsible for taste perception), is seen to be completed in the *Urdhwa amashaya* (i.e., fundus of stomach). This stage of digestion is reminiscent of salivary digestion which is completed in the fundus of stomach where the insoluble starch polysaccharides is converted to soluble dextrin, under the influence of salivary amylase (ptyalin)

**Starch Erythro-dextrin Achro-dextrin Stable Dextrin:** The action of the salivary amylase is of the nature of *Bhinnasamghata* (spitting) brought about by hydrolysis. The final *Rasa* (taste) of the resultant product in the upper portion of the *Urdhwa amashaya* (fundus of stomach) is *Madhura* [18].

The movement or the propulsion of food from the mouth to the *Urdhwa amashaya* is brought by *Prana Vayu* (One type of *Vata dosha* responsible for respiration and swallowing) which according to Acharya Charaka is said to be responsible for *Sthivanam* (the spitting of saliva), *Ksavathu* (sneezing), *Udgara* (belching) and *Aahara karma* (deglutition or the act of swallowing) and respiration [19].

The concept of *Bodhaka Kapha* parallels the description of saliva secreted by the salivary glands, especially parotid. These glands also secrete enzyme ptyalin. Thus the outcome of the action of *Bodhaka Kapha* on food leads to sweet taste in mouth. By now the insoluble *Madhura* portion of food becomes sufficiently soluble and mixes up with the frothy *Kledaka Kapha* (mucin) present in the *Urdhwa amashaya* [20].

In the language of modern physiology, the stages associated with the digestion of carbohydrates in the gastrointestinal tract mean the first stage *Madura-Baba*. When food is chewed, it mixes with saliva (ptyalin) to hydrolyze starch into the disaccharide maltose and other small glucose polymers containing 3 to 9 glucose molecules. Further digestion takes place in the small intestine, where pancreatic secretions, namely  $\alpha$ -amylase, digest almost all the starch into maltose and other small glucose polymers. Digestion is also carried out by enterocytes that line the villi of

the small intestine and contain four enzymes. Lactase breaks down lactose into galactose and glucose. Sucrase splits sucrose into fructose and glucose. Maltase splits maltose into small glucose polymers and glucose. Thus, the final product of carbohydrate digestion is all monosaccharide. They are all water soluble and are absorbed immediately into portal blood [21–23].

### ***The Amlabhava of Avasthapaka in pachayamanashya***

The *Madhur bhava* of the *Avasthapaka* is seen to be brought to an end by the hydrochloric acid (HCl) secreted by the cells of the mucus membrane of the stomach. This makes the commencement of the *Amalabhava* or the acid (sour) phase of *prapaka*. This paka (digestion) involves the conversion of insoluble proteins into the soluble ones under the influence of enzymes pepsin in the presence of HCl.

This aspect of *Prapaka* does not seem to have anything to do with the digestion of the end products of *Madhura Paka*, i.e., the substance the taste of which is *madhura* (sweet-carbohydrates). The process of conversion of insoluble proteins into soluble peptones in the course of the *Amlabhava* of *Prapaka* can be written as follows.

### **Proteins Proteoses Peptones:**

Simultaneously with the passage of ahara (food) reaching *Amlabhava*, *acha-pitta* (pancreatic/bile fluid) is released. As it passes slowly from the pylorus to the duodenum, the acidified chyme acts as a secretion and stimulates the duodenum to secrete a lot of intestinal juice. Gallbladder emptying occurs under the influence of partially digested food in the intestine.

It would seem that the *Vidagdha Ahara* (partly digested food) from the *Amashaya* which is *Amla* in *Rasa* stimulates the humoral mechanism located in the upper segment of *Adho Amashya* and the discharge of *Accha Pitta* into it. The term *Accha* has been interpreted by Chakrapani Dutta and Gangadgara as *Aghana* (thin) and *Swacha* (clear). It is obvious that the concept of *Accha Pitta* includes the gall bladder, bile and pancreatic secretions which together have been shown to be responsible for digestion of fats, proteins and carbohydrates [21, 24, 25].

In the parlance of modern physiology, the steps involved in digestion of proteins and fats occur in this stage. In digestion of proteins enzyme pepsin in stomach (active at pH 2-3) converts protein to proteoses, peptones and a few polypeptides. Most of protein digestion occurs in upper small intestine in the duodenum and jejunum under the influence of proteolytic enzymes from pancreatic secretions, viz., chymotrypsin, trypsin, carboxypolypeptidase, proelastase leading to digestion of small percent of proteins and formation of polypeptides and amino acids. Further digestion of peptides by peptidase in the enterocytes that lines small intestine leads to formation of amino acids. Finally, 99% of di- and tripeptides are digested to single amino acids forms within enterocytes [26].

Digestion of fats occurs starting in stomach where a small amount of triglycerides is digested in the stomach by lingual lipase. Emulsification of fat occurs for its absorption. Most of emulsification occurs in the duodenum under the influence of bile. Bile does contain a large quantity of bile salts as well as the phospholipids lecithin which is extremely important for emulsification of fat. Most of the triglycerides of the diet are split by pancreatic lipase into free fatty acids and two monoglycerides [27].

### ***The Katubhava of Avasthapaka in Pakwashaya***

The third aspect of *Avasthapaka* is spoken of as the *katubhava*. This aspect related to the acrid and pungent nature of the reaction that occurs in *Pakwasaya* or large intestine. Charaka has described the way in which the food residue or *Annakitta* is dealt with in this part of GIT. Charaka narrates that the material passed down from the *Amashaya* having reached the *Pakwashaya* is dehydrated and converted into lumps by heat and acrid pungent gas being produced in the process.

Amplifying this description, *Chakrapani Datta* has observed that the term *Sosana* (absorption) used by *Charaka* instead of *pachana* (digestion) is significant. The former in his view relates to the dehydration of the food residue which has been brought to the *Pakwashaya* whereas the latter refers to the digestion of food in the *Amashaya* by *Agni*. The term *Pari pindita Pakwasaya* refers to the process of the formation of fecal lumps. The term *Vayusyat Katubhavatah* describes the production in the process of an acrid and pungent gas [21, 28].

In the parlance of modern physiology, with the passage of contents in small intestine maximum process of digestion and absorption is completed. As the contents reach the large intestine, absorption of remaining nutrients is completed. In large intestine, more water and salts are absorbed and the remaining material is now converted into feces which leave the body.

The large intestine is the nidus of a large bacterial flora of which *Escherichia coli* is ordinarily the predominant organism. These microorganisms are shown to be involved in the alteration affection products derived from the digestion of proteins. They are described as putrefication flora which bring about the purifications of the protein residues of the food and the liberation in the process of various kinds of pungent gases with disagreeable and often foul odors such as iodole, phenol, hydrogen sulphide, and ammonia.

The foregoing modern contribution is seen not only to confirm but also amplify the ancient Ayurvedic version of events that take place in the large intestine and the formation of feces with production of pungent *Vayu* [29].

### ***Vipaka – Post-Digestive Effect***

The post-digestive action on food has also been classified as taking place in three phases. It is important to note here that the primary phase, *Avasthapaka* – consistency of three phases – *Madhura*, *Amla*, *Katu* occur for every type of food. But the post-digestive phase, *Vipaka* takes place depending upon the quality of the food ingested.

The ultimate change in the *Rasa* that occurs at the end of digestion by the association of (coming in contact with and being acted upon) the *Jatharagni* (fire in the stomach *vis-à-vis* digestive juice of the alimentary tract) is called as *Vipaka* [30].

According to Acharya Charaka, the six *Rasas* yield three kinds of *Vipaka*, i.e., *Madhura* and *Lavana Rasa* to *Madhura Vipaka* (sweet), *Amla Rasa* to *Amla Vipaka* (sour) and *Katu, Tikta, Kasaya Rasa* to *Katu Vipaka*

(acid, pungent). According to Acharya Shushruta, *Vipakas* are only two – *Madhura* and *Katu Vipaka* [31, 32].

### **Secondary Digestion – Metabolism**

Secondary digestion is also known as tissue digestion or metabolism. In this phase, all the seven tissues are formed in their respective tissue channel systems with the help of *Dhatwagni*, *Vyana Vayu* and *Ranjaka pitta* and the proper food substance which is the result of primary digestion that has taken place in the gastrointestinal tract. Needless to say, this absorbed food from the intestine must contain all the necessary substances for providing nutrition to all the seven tissues in the body.

Metabolism takes place in each tissue channel. Due to this conversion, each tissue is formed in each channel for that particular tissue. *Ranjaka Pitta* is the medium through which the *dhatwagni* works for conversion. *Vyana Vayu* also aids in this conversion [33].

In modern physiology parlance, the nutrients absorbed are subjected to metabolism in the body. The metabolism of glucose in the body occurs in the form of hepatic glycogenesis, glucogenesis in muscle and other tissues, conversion to fat (lipogenesis) in adipose tissue, oxidation of glucose to supply energy, synthesis of glycoprotein, glycolipid, lactose, ribose sugars, fructose, etc., and synthesis of non-essential amino acids [34].

The metabolism of free fatty acids leads to formation of gluco-corticoids and mineralo-corticoids, formation of androgens, formation of estrogens and prostaglandin hormones [35].

The metabolism of amino acids in body leads to formation of tissue proteins, plasma protein formation, formation of globin of Hb, formation of enzyme proteins, formation of protein hormones and neurotransmitters, formation of other nitrogenous substances, e.g., choline, purines and pyrimidines, formation of glucose (glucogenic amino acids), formation of biogenic amines and polyamines, ketone body formation (ketogenic amino acids), ammonia and urea formation [36].

### **DISCUSSION**

*Avasthapaka* refers to series of changes which *Ahara dravyas* (food) undergo in the *Kostha* (alimentary tract) [37]. *Agni* is the only chemical agency responsible for *Ahara Pachana* (digestion) in the *kostha* (corresponding to gastrointestinal digestion) [38]. In the first stage of digestion (*Madhura Avasthapaka*), the food in *Urdhwa amashaya* (fundus of stomach) attains *Madhura bhava* by action of salivary amylase on starch, digestion of carbohydrates occur into simpler forms (glucose) rendering it fit for absorption.

In the second stage (*Amla Avasthapaka*), the *Ahara* is stated to undergo *Amlabhava/Vidagdha* (partly digested food) by release of *Accha pitta* (bile/pancreatic secretions) resulting into acidified chyme formation in *Urdhwa amashaya* (fundus of stomach) and pylorus of stomach. In parallel to modern physiology, digestion of proteins and fats occur in this stage resulting into simpler forms, i.e., amino acids and free fatty acids.

In the third phase (*Katu Avasthapaka*), *Paripindita Pakvasya Vayu* the absorption of nutrients occur in the large intestine and formation of feces with production of pungent *Vayu* occur. *Bhutagni*, ignited by *Jatharagni* transforms the *Vijatiya Annarasa* into *Sajatiya Poshaka dhatus* (organism specific). After

*Bhutagnipaka*, *Dhatwagnipaka* occur in which the *Ahara Rasa* absorbed from the *Adhoamashaya* is subjected to Paka(digestion) before it is utilized. The *Prasadabhaga* as *Poshya* or *Asthayi dhatu* and *Kittabhaga*, some portion of which are used up the body and others are eliminated out as metabolic waste product.

*Dravyas* are either *Tulya* or *Visitha* which cause an increase or decrease of the *dhatu*s (tissues) due to properties potentially inherited by them, i.e., homologous properties of *Dravyas* cause sufficient and rapid increase of identical or homologous properties in the *dhatu*s [39]. Thus, all the seven tissues are formed in their respective tissue channel system with the help of *Dhatwagni Vyana Vayu* and food substances which are the result of primary digestion that has taken place in the gastro-intestinal tract.

## CONCLUSIONS

Ayurveda is one of the great gifts given to mankind by the ancient Indian sages. Food is essential to life, just as oxygen is essential to life. Agni is commonly used for the digestion and metabolism of food and for processing when it is suitable for digestion. When food is digested in the Amashaya and Pachayamanashaya (corresponding to the stomach and small intestine), complex food substances are converted into simple forms (i.e., can break down complex proteins into amino acids, fats into fatty acids and glycerol, and starch into glucose, making them suitable for absorption in kayagni (digestive fluids containing powerful enzymes, acids and bases in terms of modern physiology).

Sara and Kitta Vibhajana are applied to food promoted by Pakvashaya. The sara (pure) part undergoes various metabolic processes under the influence of dhatvagni to form dhatu and updhatu, while the kitta (waste) part excretes metabolites (feces, urine) from the body. Thus, the concept of Aaharapacka in Ayurveda represents its relevance to the modern physiology of digestion and metabolism, providing extensive research and scientific status in the current scenario.

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