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MADHUR AWASTHA PAKA AND CARBOHYDRATE DIGESTION: A COMPREHENSIVE REVIEW

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INTRODUCTION

Ayurveda being a treasure for the knowledge of science over time has always focused on its aim to sustain the health of the healthy and treat the diseased. To support this purpose, it has three pillars- Ahara, Nidra & Brahmacharya and among its Ahara is considered as the most vital part as it acts as a base for complete mind- body functioning.

According to the basics of Ayurveda, for the proper functioning of all the systems, Ahara Rasa needs to sustain its qualities and for that the Aharapaka Prakriya (the conversion of rasa-minute, liquefied and absorbable from Ahara-graasa) is to be done appropriately. This article contains the correlation of the madhur awasthapaka of Ahara digestion with the formation of the glucose in the carbohydrate digestion.

KEYWORDS: Madhur Awasthapaka, Aharapaka Prakriya

LITERARY REVIEW

AAHAR

According to Acharya Sushruta & Sharangdhara, (food) that we intake gets digested with the help of Jatharagni and forms Ahara rasa from the sara bhaga of sara-kitta vibhajan. The Ahara rasa further nourishes the sapta dhatu and its essence; the Ojas, with the help of its basic qualities- dravatva and sukshmata. The Ahara rasa, according to Acharya Dalhan performs the following functions: Tarpan, Vardhan, Dharan and Yapan.[1]

AHARPAKA PRAKRIYA

As the word Aharapaka means the process of digestion of panchbhutatmaka and shadrastmaka food. The ingested food undergoes several breakdowns through the pachakagni

and pachakpitta in the mahastrotas. There it gains its first quality Sukshmata as the morsel (graasa) cannot be directly absorbed by the body.

Acharya Charaka in Grahini Chikitsa Adhyaya has mentioned that firstly Ahara undergoes Samanyapaka (Sthul paka) and then it undergoes Visheshapaka(Anupaka/ Awasthapaka).[2]

The process of Samanyapaka includes swallowing by prana vayu, lubrication by Kledaka kapha, stimulation of Agni by Samana Vayu, the digestion of the ingested food by Pachakagni and then the Sara-Kitta Vibhajana from where if further continues to get converted into ahara rasa through dhatvagni.

The Visheshapaka including two terms Awasthapaka(prapaka) and Vipaka(nisthapaka) deals with the significant transformation of the ingested food where the sequential transformation is called Awasthapaka while the final outcome is termed as Vipaka. Only after Vipaka can the absorption take place. In the different stages of Awasthapaka, the nutritive essence required for Doshas and Dhatus becomes available in the Rasa, and then through the absorption of Ahara Rasa, the nourishment of the Dhatus is accomplished.

AWASTHAPAKA[3]

This is the first stage in the process of digestion. Considering it "first" signifies "the digestion in the first stage or the significant stage where the digestion starts from". Various stages of this processing take place in the mahastrotas (Alimentary canal). It is further classified into three stages;

1. Madhur Awasthapaka: from mouth to upper part of the stomach (urdhvabhaga of amashaya),
2. Amla Awasthapaka: from lower part of the stomach (adhobhaga of amashya) to initial part of the small intestine (urdhvabhaga of pakwashaya),
3. Katu Awasthapaka: remaining part of the Pakwashaya.

According to Acharya Chakrapani, the respective rasas are present at these specific sites mentioned above and digestion is carried out by the Agneya-ansh(agni) present at these sites. The elements used in the process are directly connected to the digestion and hence comes under Awasthapaka itself.

In these stages of awasthapaka, the stimulation and increase of doshas takes place in the following manner:

i. After madhur awasthapak: increase of Kapha
ii. After amla awasthapaka: increase of Pitta
iii. After katu awasthapaka: increase of Vata.

MADHUR AWASTHAPAKA

This is the first stage of digestion. As the Shadrasatmaka food is ingested, mastication starts and then it is mixed with the sneha-ansa (unctuous portion) of a subtype of Kapha- Bodhak Kapha, which is situated in the oral cavity to recognize the madhur rasadi of the bolus present in the mouth. The Bodhak Kapha also contains the teja-ansa which initiates the digestion of food in the oral cavity. The masticated food is then swallowed by the help of Prana Vayu and reaches urdhvabhaga of Amashaya.

According to Acharya Vagbhatta, the Kledaka Kapha living in the urdhvabhaga of amashaya mixes with the food to moisten it and divide into smaller parts for further processing. Being reached till the intestinal division, the food with Kledaka kapha now faces constant contact with the gastric walls, due to which froth is produced.

This froth formation is validated by Acharya Charaka in the Vimanasthana where the process is compared to the froth formation at the time of boiling rice. As the froth is visible when the rice is being boiled, similarly the production of froth during the dissociation of madhur rasa from the food is seen by kapha during digestion.

This occurs due to the separation of the Prithvi and Jala mahabhuta by the action of Jatharagni and supports kapha vridhhi. On the action of Jatharagni, the masticated food further breaks into panchbhutatmik components. Among this, the fraction of Ahara Dravya destined to undergo Amlabhava (conversion into sour stage) remains intermixed with the particles of Kledaka Kapha during this phase. Thus, irrespective of the inherent taste of the food, when it reaches the Adho-amasaya (lower part of stomach), it first attains a Madhura Awasthapaka.

MODERN REVIEW[4]

The food that we intake is majorly rich in Carbohydrate, Fat and Protein which is the basic component on which the body lives. Although vitamins, minerals and other nutrients are present, they constitute a small quantity and are processed without complicacies. On the other hand, the carbohydrates, fats and proteins cannot be absorbed in their original form and are useless as nutrients without their preliminary digestion. This signifies the importance of these

macromolecules in our diet.

CARBOHYDRATE DIGESTION

Carbohydrate is a macronutrient that provides energy to the body. It is an organic compound made up of Carbon(C), Hydrogen(H), and Oxygen(O), usually in the ratio of 1:2:1. Food contains three types of carbohydrate namely; Monosaccharides, Disaccharides and Polysaccharides. Among which, the diet is rich in either polysaccharides or disaccharides which are monomers bound by condensation. Only three major sources of carbohydrates exist in the normal human diet, they are as follow;

1. Sucrose, a disaccharide also known as cane sugar,
2. Lactose, a disaccharide found in milk,
3. Starches, which are large polysaccharides present in almost all nominal foods, particularly in potatoes and different type of grains.
4. Amylose, Glycogen, Alcohol, Lactic acid, Pyruvic acid, Pectin's, Dextrin's and other minor quantities of carbohydrates derivatives in meats are the ones ingested to slight extent.

- **STAGES OF CARBOHYDRATE DIGESTION**

a. **In the mouth**

When the food if chewed (masticated), it mixes with saliva which contains Ptyalin (an alpha-amylase), secreted by the parotid glands. This hydrolyzes starch into disaccharide maltose and other small polymers of glucose containing three to nine polymers of glucose. However, only about 5% of all starches get hydrolyzed due to the short transit time in the mouth before it is swallowed.

Starch digestion sometimes continues in the body and fundus of the stomach for about 1 hour until it gets mixed with the stomach secretions. Activity of the salivary amylase is then blocked by the acid of the gastric secretions because the amylase is essentially inactive as an enzyme once the Ph falls below about 4.0. However, 30-40% of the starches will have been hydrolyzed mainly to form maltose before the food with saliva is completely mixed with the gastric secretions. This helps in the further processing of the food as only the monosaccharides are digested in the small intestine.

b. In the small intestine

Once the partially digested chyme enters the duodenum, pancreatic secretions play the central

role in carbohydrate digestion. Pancreatic juice contains a high concentration of α-amylase, an enzyme functionally similar to salivary amylase but several times more potent. Within a short period after gastric emptying, this enzyme acts vigorously on starches and glycogen, hydrolyzing them into maltose and small glucose oligomers. By the time the chyme progresses through the duodenum and into the upper jejunum, most complex carbohydrates have already been broken down into disaccharides and short glucose polymers.

The subsequent and final stage of carbohydrate digestion is carried out at the brush border of the small intestinal epithelium. The enterocytes lining the villi express a specialized set of amolytic enzymes—lactase, sucrase, maltase, and α- dextrinase and trehalase—that are embedded in the microvillar membrane.

These enzymes act directly on the disaccharides and small glucose chains as they come into contact with the mucosal surface. Lactase catalyzes the breakdown of lactose into glucose and galactose, sucrase hydrolyzes sucrose into glucose and fructose, maltase as well as α-dextrinase reduce maltose and glucose polymers into glucose monomers and Trehalase catalyzes trehalose into glucose.

Thus, the culmination of carbohydrate digestion in the small intestine yields only monosaccharides—primarily glucose, along with galactose and fructose. Glucose represents 80% of the final product of the carbohydrate digestion and galactose and fructose represent the remaining 20%. Being water-soluble, these simple sugars are rapidly absorbed through the enterocytes into the portal circulation, making them available for immediate metabolic use or storage.

DISCUSSION

The notion of Madhur Awasthapaka described in Ayurveda represents the preliminary stage of digestion, and it closely parallels the early breakdown of carbohydrates as understood in modern physiology. In classic Ayurvedic texts, this stage is said to begin with the ingestion and mastication of food, where the bolus combines with Bodhaka Kapha in the oral cavity and later with Kledaka Kapha in the stomach. This process imparts a Madhura (sweet) predominance to the ingested food mass, irrespective of its original taste, and initiates the transition of food into a simpler, more absorbable form. The production of froth, explained through the analogy of boiling rice, signifies the separation of elemental components during this early digestion. The predominance of Kapha Dosha at this stage reflects nourishment and

anabolic tendencies.

From the modern scientific perspective, these descriptions correlate to the onset of carbohydrate digestion. Chewing ensures mechanical breakdown, while salivary secretions moisten the bolus and initiate enzymatic hydrolysis through salivary amylase (ptyalin). This enzyme acts on polysaccharides like starch and glycogen, producing disaccharides such as maltose and short glucose polymers. Although this phase is short, the initial enzymatic action prepares the food for further degradation in the stomach and small intestine. The lubricating and diluting effect of saliva bears resemblance to the role attributed to Kledaka Kapha, which facilitates smooth passage and primary processing of the ingested material.

The Ayurvedic observation of Kapha Utklesha (aggravation of Kapha) after Madhur Awasthapaka also aligns well with the metabolic role of carbohydrates. As glucose forms the major end product of carbohydrate digestion, it serves as the primary substrate for energy production and anabolic activities, highlighting a nourishing and stabilizing effect on the body—functions traditionally associated with Kapha. The froth formation described by Acharyas can be symbolically correlated to biochemical breakdown processes, where starch granules are progressively transformed into simpler more diffusible and absorbable forms, mainly monosaccharides.

Taken together, both systems emphasize a common theme: the initial phase of digestion is not a stage of complete assimilation but one of transformation. This can be observed so well from the description of the Acharya stating the sthana of madhur awasthapaka is from mouth to the fundus and body of the stomach.

Ayurveda explains this through the qualities of Madhur Rasa and Kapha Dosha, whereas modern science identifies specific enzymatic and chemical processes. Despite differences in terminology, the convergence of both perspectives underscores that the earliest phase of digestion is primarily concerned with moistening, softening, and initiating the breakdown of complex carbohydrates, thereby preparing them for subsequent stages of digestion, absorption and utilization.

CONCLUSION

In Ayurveda, Madhura Awasthapaka marks the initial phase of digestion, characterized by the

predominance of the sweet taste (madhura rasa). This stage is regulated by Bodhaka Kapha in the oral cavity and Kledaka Kapha in the stomach, while Prana Vayu aids swallowing and Samana Vayu supports peristaltic activity. Together, these factors soften, moisten, and prepare the ingested food for the action of Agni. Ayurveda thus views this stage as the nourishing foundation of digestion, providing stability and vitality to the body.

Modern physiology explains this phase through the oral and gastric processes. Food is chewed and combined with saliva, which initiates enzymatic activity. The act of swallowing, followed by coordinated peristaltic contractions, ensures its passage into the stomach. There, gastric secretions and hydrochloric acid, under the regulation of the enteric nervous system, begin the chemical disintegration of nutrients, particularly carbohydrates and proteins.

Both perspectives highlight this stage as the preparatory step in digestion. While Ayurveda emphasizes the balance of the dosas and the predominance of sweetness, modern science focuses on enzymes, acids, and neuromuscular coordination.

Madhura Awasthapaka therefore symbolizes the essential groundwork for the body's nourishment and energy supply. Thus, this signifies the relevance of the madhur awasthapaka.

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