



Review Article

www.ijrap.net

(ISSN Online:2229-3566, ISSN Print:2277-4343)



A REVIEW OF DIGESTION AND METABOLISM IN AYURVEDIC AND MODERN PERSPECTIVE

Shivani Arora ^{1*}, Chirag Arora ²

¹ Senior Research Fellow (SRF), All India Institute of Ayurveda, Delhi, India

² PG Scholar, PG Department of Kayachikitsa, Ch. Brahm Prakash Ayurved Charak Sansthan, Delhi, India

Received on: 20/05/22 Accepted on: 09/07/22

*Corresponding author

E-mail: arorashivaniyu@gmail.com

DOI: 10.7897/2277-4343.1305129

ABSTRACT

The diet nourishes the human body through digestion and metabolism, which are depicted in Ayurveda under the concepts of *Agni* (digestive/metabolic factors) and *avasthapaka* (phases of digestion). The process of breakdown down complex forms of food into simplest monomers through enzymes in the gastrointestinal tract is called digestion. As per Ayurveda, *Agni* is the key element for digestion and metabolism. It is the functional entity responsible for transforming the *ahara dravyas* (food). *Avasthapaka* is the peculiar concept coined by Acharyas to describe the various phases of digestion. Each foodstuff ingested by an individual must pass through three phases of *avasthapaka* (*madhur avasthapaka*, *amla avasthapaka* and *katu avasthapaka*) compulsorily, which later on gets converted into *sharir bhava*. In the present article, an attempt has been made to correlate the physiological aspects of *agni* and *avasthapaka* with modern medical science.

Keywords: *Agni*, *Avasthapaka*, *Ahara*, Digestion, Metabolism

INTRODUCTION

Human beings get their food from plants, animals and their products. To generate a usable energy source, food passes through a biochemical process in the human gastrointestinal tract called digestion. The digestion process commences in the mouth, where enzymes that aid digestion is released in the saliva and helps prepare food for further digestion. Enzymes break the complex dietary ingredients (carbohydrates, proteins, fats etc.) into smaller particles that get absorbed in the bloodstream, where they are immediately used as energy or stored as an energy reserve. What is left is conveyed to the large intestine for the final stages of digestion, and unusable waste is expelled from the body as excrement.

According to the classical literature of Ayurveda, *agni* (digestive/metabolic factors) plays an essential role in the digestion and metabolism of food. *Agni* acts in 13 different forms. *Jatharagni* looks after the functions of food digestion and absorption. *Bhutagni* (five types) converts the consumed *vijatiya panchbhautika dravyas* into *sajatiya panchbhautika dravyas*, i.e., conversion of heterogenous to homogenous. *Dhatwagni*, which has seven types, performs the synthesis of tissues.

The consumed food passes a sequence of biochemical processes in GIT to convert it into a usable energy source. This process allows the food to get across with different secretions, enzymes, emulsifying agents, acids and alkaline substances, thereby promoting the breakdown of complex molecules into simpler monomers under optimum pH. Correspondingly in Ayurveda, in the conversion of *Ahara* (food) into nutrient fluid, food goes through three digestion stages: *madhura*, *amla* and *katu avasthapaka* (phases of digestion). Biological substances *kapha*, *pitta* and *vata* are produced respectively in each stage.

ROLE OF JATHARAGNI

Jatharagni performs food digestion in the *amashaya* (stomach) and *pachyamanashya* (small intestine), which entails breaking down complex foods into their simpler components (with the aid of *sahakari karana* like *ushma*, *vayu*, *kleda*, *sneha*, and *kala*)¹ so that they are fit for absorption into the body and can be used and metabolized by *sharir dhatus*. The separation of *sara* (fruitful monomers of complex foods) and *kitta* (residue fraction of foods) components is another essential function of *jatharagni*.

The physical and biochemical transformation of food takes place in three stages. *Madhur*, *amla* and *katu* become dominant in different phases of digestion. On this ground, digestion has been classified into three stages, i.e., *madhur avasthapaka*, *amla avasthapaka* and *katu avasthapaka*.

Madhur avasthapaka

This phase starts from the entry of food into the mouth. Propulsion of food from the mouth to the *urdhwa amashaya* (fundus of the stomach) is brought by *prana vayu*². This aspect of digestion in upper *amashaya* is comprehended by *madhur bhava*. The digestion course is exclusively the fraction it commences in the mouth under the influence of *bodhak kapha* (*Bodhak kapha* is equivalent to saliva). This stage is reminiscent of salivary digestion and is finished in the fundus of the stomach. The insoluble starch polysaccharide is converted to soluble dextrin under salivary amylase (ptyalin). The action of salivary amylase is *bhinna sanghata* (splitting), brought about by hydrolysis³. The resultant product's eventual *rasa* (taste) is *madhura* and completed in the *urdhwa amashaya*. *Bodhak kapha* on food converts insoluble *madhur* portion to soluble and mixes up with the frothy *kledaka kapha* (mucous) present in *urdhwa amashaya*⁴.

Amla avasthapaka

Digestion of proteins and fats occurs in this phase by *pachak pitta* (HCl) secreted by the mucus membrane of stomach cells. This

starts the *amla bhava* or acidic (sour) phase of *avasthapaka*. In this stage of digestion, the pepsin enzyme, in the presence of HCl, changes insoluble proteins into soluble ones. This stage produces acidified chyme. It is in the *pakwa-apakwa* stage (not completely digested). In *adho amashaya*, it goes through further digestion. This partially digested food that has acquired *amlobhava* is transported below and encourages the humoral mechanism in *adho amashasya* and discharge of *accha pitta* into it. The pancreatic secretions and gall bladder bile, which are responsible for continuing to digest partially digested lipids, proteins, and carbohydrates, are included in the *accha pitta* notion⁵.

Katu avasthapaka

After *Amla*, *avasthapaka* food enters the final stage of digestion in *pakwashaya*. With the action of *agni*, it undergoes *shoshana* and attains *paripindita rupa* with predominant *katu bhava*, thus generating *vata dosha*⁶. As per contemporary science, digested food enters the large intestine after the digestion of proteins and fats. The mucosa of the large intestine can absorb sodium actively, along with water and electrolytes. The faeces constitute many salts, insoluble calcium, phosphates, high bicarbonate, and water. Due to the movement of chloride and other negatively charged ions out of the colon into intestinal fluid, little water is lost with the faeces. Bacilli in the absorbent colon aid in the digestion of a small amount of cellulose. Other substances build as a result of bacterial activity are vitamin K, vitamin B12, thiamine, riboflavin and various gases that contribute to flatus⁷.

ROLE OF BHUTAGNI

The *bhutangis* is found in the fundamental elements (*Bhutas*). There are five different kinds of them, one for each of the five fundamental elements: *parthiva* (earth), *apya* (water), *tejas* (*agni*), *vayavya* (*vayu*), and *nabhasa* (akash). The five *mahabhutas* (*panchbhautika*) and respective five *bhutagni* (*dhatu parmanu*) are components of every cell in the body. Therefore, they are alike in terms of the five fundamental components and their *bhutagni* in our body cells and in every outside nutrient we ingest to nourish our bodies. The *bahya panchbhautika amshas* is to nurture and nourish the *panchbhautika sharir*. A mechanism called *paka* (metabolic transformation), attributed to *bhutagni*, turns the aforementioned alien *amshas* into part of the body. The five *bhutagnis* digest particular elements present in the food. Following food digestion by the *bhutagni*, digested substances that have the elements and traits that are identical to each *bhuta* nourish those body parts' unique *bhautika* constituents. Therefore, for all foreign compounds to become endogenous, they must undergo *bhutagni paka* so that the tissues receive the proper nourishment⁸.

In modern science, it can be correlated with the enzymatic functions performed by the liver. In the metabolism of food particles, the liver has multi-fold enzymatic actions on the food⁹.

ROLE OF DHATWAGNI

In Ayurveda, the metabolism process is performed by seven kinds of *dhatwagni* in their corresponding *dhatu*. After enzymatic action, digestive end products form and reach circulation through the lymphatic and blood circulatory systems. From there on, the end products of complex food reach the cells via energy-dependent or non-dependent processes.

According to Ayurveda, *ahara rasa* (*panchbhautika*), which is made suitable for metabolism into *dhatu*s, circulates and reaches *dhatu*s simultaneously, with each *dhatu* in the body selecting the

specific *dravya* from among the five *panchbhautika dravyas* that can nourish and grow that specific *dhatu*. The amount of *dravya* that *dhatu* is supposed to consume closely correlates with the body's requirements and necessities. Those *dravyas* that predominately have the same *mahabhuta* as in the *dhatu* are accepted by the *dhatu*s. For example, *rakta dhatu* is rich in *agni mahabhuta*, so it takes *agni mahabhuta pradhan dravya*. There is a mix-up of Ayurveda principles: *Ek – kaal dhatu poshan nyaya* and *khale kapot nyaya*¹⁰.

Dhatwagni governs the equilibrium between catabolism and anabolism of *dhatu*. According to the commentator *Chakrapani*¹¹, *rasadi dhatu*s continually undergo destruction and are replaced by *panchbhautika* nutrients. Additionally, he claimed that the *dhatu*s are produced through anabolic processes and lost due to catabolic events, i.e., *sharir dhatu*s that their *agnis* destroy are regenerated by four different types of *ahara*.

DISCUSSION

Agni is the only chemical entity responsible for *pachana* (digestion). *Avasthapaka* signifies *ahara dravyas* undergo changes in the *koshtha* (alimentary canal).

During the first stage of digestion (*madhur avasthapaka*), the food in *amashaya* attains *madhur bhava* by the action of salivary amylase on starch. Digestion of carbohydrates occurs in this stage, converting it into a more straightforward form of glucose, rendering it fit for absorption. Mix food in the stomach with gastric secretions to form a semi-fluid mixture called chyme. Chyme parallels the formation of the *phenbhoot* production of *kapha*. In the second stage (*amla avasthapaka*), *ahara* undergoes vigorous digestion in *pachyamanashaya*. *Amla bhava* develops due to the action of the acidic medium of chyme (pH – 2 to 3), resulting in sourness. In the third stage (*katu avasthapaka*), absorption of water and electrolytes occurs in the large intestine. Usually, 5-10 litres of water and electrolytes are absorbed daily from the *pakwashaya*. The term *paripindita pakwashaya* refers to the bolus form of faecal matter after maximum water absorption. *Vayusyat katubhavatah* denotes producing odoriferous products and pungent gases like carbon dioxide, methane and hydrogen.

CONCLUSION

In modern and ancient science, the idea of food digestion and metabolism is somewhat similar. Due to their similar roles, *jatharagni* and *bhutagni* are significantly closer to digestive enzymes. *Dhatwagni* has cellular effects and is crucial to metabolism. Consequently, it might be connected to cellular enzymes.

REFERENCES

1. Charaka Samhita of Agnivesha with "Vidyotini" Hindi commentary by Pt. Kashinath Shastri and Dr Gorakhnath Chaturvedi, Vol-I, Published by Chaukhamba Bharati Academy, Edition-Reprint, 2013, p 901.
2. Agnivesh's Charaka Samhita Chikitsa Sthana 28/6, 15/6-8, text with English translation by RK Sharma and Bhagavandas volume III, Published by Chaukhamba Sanskrit Series, Varanasi. 2009
3. Vd. Dash Bhagwan, Concept of Agni in Ayurveda with Special Reference to Agnibala Pariksha. Varanasi: Chaukhamba Amarabharati Prakashan; 2nd. 1993
4. Dwarkanath C. Digestion and Metabolism in Ayurveda. Varanasi: Krishnadas Academy, 2nd. 1997; P 59
5. Dwarkanath C. Digestion and Metabolism in Ayurveda. Varanasi: Krishnadas Academy, 2nd. 1997; P 60

6. Charaka Samhita of Agnivesa revised by Charaka and Dridhbala with Ayurveda Dipika commentary of Chakrapani Datta Chikitsa sthana, Vaidya Jadavji Trikamji Acharya, Chaukhamba Orientalia 2015 Reprint Edition, P 512 verse 11.
7. Guyton & Hall, textbook of medical physiology, 11th edition, New Delhi India, Saunders Elsevier India private limited, 2008, P 817.
8. Agnivesh's Charaka Samhita Chikitsa Sthana 15/13, 14, text with English translation by RK Sharma and Bhagavandas volume III, Published by Chaukhamba Sanskrit Series, Varanasi. 2009
9. Akash Kumar Agrawal, CR Yadav, and MS Meena, Ayu. Physiological aspects of Agni, 2010 DOI: 10.4103/0974-8520.77159
10. Kumar PA, Kamleshwar P, Narayan MR. Unique Journal of Ayurvedic and Herbal Medicines 2015;3(1):19-23. Available from: <http://ujconline.net/wp-content/uploads/2013/09/6-UJAHM-15155-Rs.pdf>
11. Charaka Samhita of Agnivesha with Ayurveda Deepika Commentary, edited by Vaidya Jadavaji Trikamji Acharya, Published by Chaukhamba Surbharati Prakashan, Edition Reprint- 2005, P 174.

Cite this article as:

Shivani Arora and Chirag Arora. A review of digestion and metabolism in Ayurvedic and modern perspective. *Int. J. Res. Ayurveda Pharm.* 2022;13(5):84-86
<http://dx.doi.org/10.7897/2277-4343.1305129>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publishing quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.