

CONCEPT OF JATHARAGNI IN AYURVEDA WITH SPECIAL REFERENCE TO ENZYMES

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ABSTRACT :

In *Ayurvedic* system of medicine, *Agni* maximally represents digestive & metabolic fire in the body. It is the substance in the secretions of the body which are directly responsible for digestive and chemical changes in the body. Ingested food is to be digested, absorbed and assimilated, which is unavoidable for the maintenance of life, and is performed by the *Agni*. According to the functions and site of action, *Agni* has been divided into 13 types, i.e. one *Jatharagni* (digestive enzymes), five *bhutagni* and seven *dhatvagni* (metabolism at tissue level). *Jatharagni* is the chief among all types of *agni*'s because function of *bhutagni* and *dhatvagni* depend on this. Aggravation or diminution of *jatharagni* results in aggravation or diminution of *bhutagni* and *dhatvagni*. All the diseases are caused due to impaired function of *Agni*. According to modern science, Gastric juice and enzymes functioning at gastro intestinal level, all are responsible for digestion, absorption and metabolism. Altered function of the enzymes secreted from gastro intestinal tract is responsible for production of gastro intestinal diseases. Function of *Agni* is likely to be compared with gastric juice and different enzymes at gastro intestinal level.

Key words: *Agni*, *Jatharagni*, Digestion, Metabolism, Enzymes

INTRODUCTION: *Agni* may be correlates with digestive (*pak*) and different kinds of hormones, enzymes and co-enzymes activities etc. which participate in these digestive & metabolic functions. Due to increased activity of *pitta* in *yuva- vastha* (young stage) digestive & metabolic rate are higher. Vigor & vitality of human being is also maintained by balanced activity of *Agni*. It is necessary for proper growth & development of the body & their parts¹. Due to advancement in age, depletion of *Agni* is taking place (in old age) which cause instability in *Agni*, ultimately leads to decrease, decay, atrophy, decay due to defective digestion and metabolism². For better understanding the concept of *Agni*, we have needed to establish a rela-

tionship with enzymatic theory of medical science. The breakdown of complex form of food into simplex monomers through an enzymatic process in gastrointestinal tract is called digestion. Similarly in *Ayurveda*, the conversion of *panchbhautic ahar* (complex food) into monomers of *panchmahabhuta* (simplest form of food) is taken place by *Jatharagni* and *bhutagni* in human gut respectively.

AIMS AND OBJECTIVES:

1. To emphasize and discuss the importance of *jatharagni* in *Ayurvedic* classical literature.
2. To evaluate the process of digestion in *Ayurvedic* classical texts and in modern texts.

3. To evaluate correlation about digestion w.s.r.to enzymes and Agni.

MATERIALS AND METHODS: Basically this article is review of various Ayurvedic classical texts. Materials related to *agni*, *ahara paka* (Metabolic transformations) in *Ayurveda* and other related topics have been collected from various *Ayurvedic* classical texts. The references were compiled, analyzed and discussed for a thorough and in-depth understanding of the concept of *Agni* and *ahara paka* (Metabolic transformations) in *Ayurveda*. The *samhitas* used in the present study were *Charaka Samhita*, *Sushruta Samhita* and *Astanga Hridaya* with commentaries on them. The modern medical literatures as well as other various related information were collected from related websites.

Concept of Agni: Human body is derived from food. In healthy state the food consumed is properly digested and assimilated by the body with the help of *Agni*. *Agni* provides *Bala*, *Arogya*, *Ayu*, *Prana*, *Swasthyam*, *Varnam*, *Utsaha*, *Prabha*, *Oja* and *Teja* to the body³. All the transformations in the body is catalyzed by *Agni*, if *Agni* is impaired, the proper transformation of food, *Dhatus* and *Malas* are impaired and this will lead to accumulation of waste products in the body. *Agni Dusthi* is the causative factor for most of the diseases⁴. The normal activity of the *Agni* helps the maintenance of physiological activities while its abnormal state produces pathology and its absence causes death of the human being that is why *Agni* is known as *Mula* or Vital force⁵. *Agni* is closely related to *Pitta*. The main function of *Pitta* is described as *pachana*, separation of *sara* and *kitta*, *Dahana*, *Bhinnasanghata*,

Parinama, *Ranjana*, *Varnakarana* and *Prabhakarana*. The term *Agni* not only includes *Jatharagni* but also *Bhutagnis* and *Dhatwagnis*. These are responsible for digestion and metabolism at different levels. These are as follows:

[A] *Jatharagni* - 1 [B] *Dhatwagni* - 5
[C] *Bhutagni* - 7

Importance of Jatharagni: *Vata* (*Prana*, *apana*, *samana* and *udana*) augments the digestive fire. Power of *Agni* or normal condition of *Agni* is responsible for strength, health, longevity and vital breath. That's why it should be protected by proper intake of food and drink because these act as a fuel, if person is deprived of foods and drinks, *Agni* becomes disturbed. Consumption of food may be of various forms i.e. eatables, beverages, linctus (licked) and masticable foods, which is wholesome if consumed in suitable quantity and free from contamination. These substances undergo metabolic transformation by the effect of *jatharagni*, *bhutagni* and *dhatvagni*. Initially *jatharagni* gives stimulation to *bhutagni* because consumed food is *panchabhoutika*, it has to undergo transformation by the respective *bhutagni*'s then only it becomes easy for digestion by *jatharagni* and tissue metabolism by *dhatvagnis*. Then processed metabolic products circulate inside the *srotas* continuously by the help of *vata dosha*(central nervous system). This favours the development, strength, complexion and happiness as well as growth of tissues. *Dhatus* remain in their normalcy after receiving respective nutrients from metabolised food substances. *Jatharagni* is the main principle substance responsible for disease and health. During its normalcy it is

responsible for longevity, complexion, strength, health, enthusiasm, well built, lustre, immunity (*ojas*), temperature; other *agni*'s (*bhutagni* and *dhatvagni*) and other vital functions all are dependent on *jatharagni*. Healthy state of body and diseased condition both are entirely dependent on *agni*. Food nourishes body *dhatu*s, *ojas*, *strength*, *complexion* etc. It all depends on equilibrium state of *agni* otherwise *rasa* (essence of food like plasma, white blood cells, lymph etc) etc. cannot be produced or manufactured from undigested food. *Agni* present in the *jathara* which digests the food is *Bhagawan Ishwara*- almighty God- himself; it receives (substances of) sweet and other tastes (for growth and maintenance of the body), due to its subtleness (minuteness) it is not possible to perceive him. It is served by *prana*, *apana* and *samana* (the three divisions of *vata dosha*), by blowing/increasing, protecting and preserving it. It augments other *Agni*'s to carry out their respective functions. In healthy individuals during awakening and sleep, the digestive fire excited by *samana vata* due to association of inspiration and expiration and being blown by *udana vata* proper digestion takes place⁶. Therefore by all means one has to protect *jatharagni* by consuming suitable wholesome dietetics and behaviour because longevity and strength depends on normal state of *Agni*. On the contrary one, who consumes unwholesome diet due to greed, succumbs to disease caused by the vitiation of *grahani* (small intestine). Irregular digestion and metabolism causes imbalance in *dhatu*s. The intense digestion and metabolism and less consumption of food leads to depletion of *dhatu*s⁶.

Jatharagni Vyapara- Process of Digestion at Stomach and Intestine:

By the help of *pranavata* food enters the *kostha* (the tubular passage between the mouth and the anus, including the organs through which food passes for digestion and elimination as waste) where the food gets disintegrated by fluids and softened by unctuous substances. *Samanavata* stimulates the *jatharagni* which is situated in *amashay* (stomach including duodenum) as a result proper digestion process starts. *Agni* performs normal functions when food consumed in appropriate quantity along with appropriate time and quantity serve as promoter of longevity. Fire helps to boil the rice mixed water for proper cooking; in the same way *agni* stimulates the digestion process for the food substances which are present in *amashay* for the production of essence and waste products. During the first stage of digestion sweetness is manifested resulting in the stimulation of *kapha* (immune components), which is thin and frothy in nature. During the process of digestion food remain in the semidigested form i.e. in the form of sourness. This substance moving downwards from the *amashay* and stimulates the production of transparent liquid called *pitta* (digestive and metabolism components) and it is the second stage of digestion. When transformed food reaches the *pakvashay* (intestine) further transformation takes place and it becomes dried up by *agni* and it attains bolus form resulting in pungent taste and it stimulates *vata* (central nervous system) and it is the last stage of digestion⁶. This concept of digestion may be correlated to the process in the alimentary canal by which food is broken up chemically, as by

the action of enzymes, and converted into a substance suitable for absorption and assimilation into the body. The process of making food absorbable by dissolving it and breaking it down into simpler chemical compounds that occurs in the living body chiefly through the action of enzymes secreted into the alimentary canal takes place at stomach can be compared to the action of *jatharagni*. There the saliva-food mixture continues to undergo the salivary chemical process, provided the stomach is not too crowded with protein food at the same time. The stomach is chiefly an organ secreting the chemicals for digesting protein. In its inner surface are lodged glands which produce their characteristic chemicals- hydrochloric acid, pepsin and rennin for digesting protein and lipase for digesting fat. The outer walls of the stomach are composed of muscular and connective tissues. The stomach also has a very rich blood and nerve supply. The blood supplies the glands with the constituent elements necessary for producing the digestive juices. The nerves furnish energy to the cells of the stomach for their mechanical and chemical functioning. The normal, healthy stomach has a good supply of nerve energy. When the nerve energy is below par, a vicious cycle of digestive disturbances may start. Abnormally delayed motion, or too much or too little secretion of digestive chemicals, is caused when the nerves of the stomach are hyperirritated or depressed. When the strength of *vata* dosha is diminished leading to a vicious cycle of digestive and motor disturbances causing delayed motion or too much or too little secretion of digestive chemicals. Such events may lead to *mandagni*, *teekshnagni*, and *vishamagni*

and favours the development of *ama* (improperly processed food substance inside the GI Tract), it is the root cause for the development of most of the diseases. The mechanical work of the stomach, like the mechanical work of the mouth, assures that the proper changes take place in the food to reduce it to simpler compounds. The stomach is more complex in its operation than the mouth. It retains food for a longer period of time before it completes its share of the process and sends the food on to the intestines⁷. Such events may be compared to events of *jatharagni* functions. Blood supply and nerve supply concept of modern medicine may be correlated to activities of *pitta* and *vata* dosha. The description of *Kledaka kapha* corresponds, in part, to that of the mucous secreted by the glands of the stomach viz., the *Kledaka kapha* present in the *amashaya* moistens the food, disintegrates or breaks and liquefies it. Based on above description that a fatty fluid possessing the aspects of the *kapha* is secreted in the course of the *madhura* aspect of the *avasthapaka* will point to the fact that (a) *Kledaka* is the gastric mucous and (b) the fatty fluid possessing the qualities of *kapha* is the mucin reflex secreted by the cardiac glands of the stomach as the food reaches this organ. Chronologically speaking it would appear that the credit of having discovered and described the complicated mechanism of the secretory activities of gastrointestinal tract goes to *Punarvasu Atreya*, as could be seen not only from the description of the *prathamapaka* of the *avasthapaka*, which pertains to the gastric aspects of the digestion of carbohydrates and proteins but also to subsequent events that follow in the wake

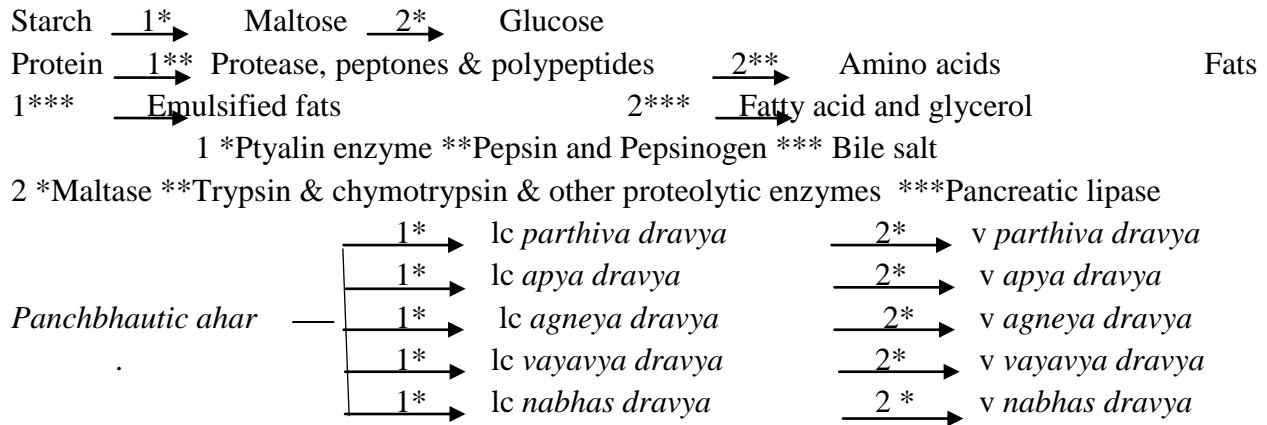
of the movement of gastric digest through the pylorus into the duodenum. It is thus seen recorded in *Charaka Samhita* that “there after as the partly digested food which has attained *amlabhava* is moved down, *acchapitta* is secreted. *Acchapitta* means *aghana* or light or clear. The term *amla* refers to the production of *pitta* under the influence of the *ahara* or food which has since assumed *amlabhava*(qualities of sourness). It was also mentioned that the term *Jatharagni* itself is, in so far as the gastro intestinal digestion is concerned, a complex of powerful digestive substances, and in main, the gastrointestinal cathepsins. The analogues of the cathepsin enzyme was shown to be universally present in all tissues of the body and that these are reminiscent of the concept of the intestine located *pachaka pitta*(-complex) and the contribution of its *amashas* to the *dhatu*⁸.

Role of Bhutagni: The digestion of food by *jatharagni* leads to the breakdown i.e. *sanghatbheda* of complex *panchabhautik* food into five distinct less complicated groups of *dravya* viz. *parthiva*, *apya*, *agneya*, *vayavya*, & *nabhasa*⁹. The part of *agni* (*bhutagni*) is present in *dravya* of belonging to each group & this *agni*, digest the *dravya* of that group. It means, there is a radical changes in the qualities of each group of substance i.e. *vilakshanaguna*, said

by *Chakrapani*¹⁰. Thus, the food substances retain the *vilakshanaguna* are rendered fit for being absorption, assimilation into *dhatu*. The end product of *bhutagnipaka* is known as *poshakadravya*¹¹ or *poshakrasa* and transformed into a homologous substance.

Reciprocal correlation about digestion w.s.r.to enzymes and Agni: According to modern medical science, food is a chemical combination of mainly carbohydrate, protein, fats and other minor ingredient like minerals and vitamins etc. After digestion, these chemical polymers break into their respective monomers such as carbohydrate into glucose, protein into amino acids and fats into fatty acids and glycerol. Like that, there is no concept of chemical, like carbohydrate, protein and fats as food ingredients in *ayurveda*. But ancient medical text has own ideal and universal notion regarding to food (*ahara*) and explained that “every matters of universe is composed of five monomers” i.e. *panchamahabhut*. It means our food stuff is a different types of combinations of complicated polymers which are build up of their respective monomers (*akash,vayu, agni, jala & parthiva mahabhut*). Like medical science, after digestion of *panchbhautik ahar* converts into small monomers like *akash* etc.

Enzymatic transformation of food



Note: lc- less complicated, v- vilakshangunyukta, 1* the site of action of *jatharagni* at enzymatic level where ptyline, pepsin and blie salts act.2*the site of action of the *bhutagni* at enzymatic level where maltase, trypsin, chymotrypsin and pancreatic lipase act.

Role of Dhatwagni: Each *Dhatwagni* attends the digestion supplied to that *Dhatu* from circulating *Poshakamsha*. For example the *Dhatwagni* present in *mamsa Dhatu* digest the nutrient material required for *Mamsa Dhatu* only, but cannot digest those of other *Dhatu*s. *Dhatwagni* is essential for the maintenance and growth of the *Dhatu*s. Functions of *Dhatvagnis* are mainly two. One is synthesis of new tissue and second is to yield energy for the function of tissue. If *Dhatvagni* is impaired both of these will impair¹². As the weakness of *Jatharagni* leads to formation of *Ama*, the weakness of *Dhatwagni* also leads to production and accumulation of *Ama* in *Dhatu* (tissue level) concerned, giving rise to improper *Dhatu Vriddhi*. If *Jatharagni* is strong *Dhatwagni* also become strong. If *Dhatwagni* is stronger, they utilize quickly the quantity of nutrients supplied and still not getting satisfied and begins to destroy the *Dhatu*s itself. This leads to *Dhatukshaya*. Hence both *vridhhi* and *kshaya* of the *Dhatu*s are *vikrita* and are mainly due to weak and powerful *Dhatwagnis* respectively¹³.

DISCUSSION: According to modern science, it is also seen that digestive system is composed of the gastrointestinal tract, three pairs of salivary glands, the liver and pancreas. The digestive system receives the food composed of protein, lipids, carbohydrates, vitamins, minerals and water of them the proteins, lipids, and carbohydrates require digestion but all need to be absorbed from the gut. The food we take is placed first in the mouth and then chewed to make it suitable for swallowing by mixing with saliva, the secretion of salivary glands, the food is then formed into bolus which is swallowed with the help of tongue, pharynx, palate etc and is passed through the esophagus to the stomach. In stomach the bolus is mixed with the gastric juice and is pulverized by the movements of stomach. The food is converted into chime, a semi fluid substance and then sent into the duodenum. In the small intestine the chime mixes with the secretion from liver and pancreas. Along with these two there is also the secretion from the small intestine which also mixes with the chime by the agitation produced by

the movements of the small intestine and the process of digestion continuous. After digestion, extensive absorption occurs in the small intestine and whatever remains at the end is delivered to large intestine. In colon there is absorption of water and electrolytes along with other materials and the chime is converted into a semisolid mass. This is stored in pelvic colon. During defecation this semisolid material is passed out as stool through rectum and anal canal¹⁴. The function of *Agni* can be compared with the gastric juice, different enzymes, hormones at G.I level¹⁵. Altered function of the enzymes secreted from G.I tract is responsible for production of gastro intestinal diseases. The digestion, absorption, metabolism all are dependent on the different secretion, enzymes, or hormones of G.I system as well as on *Agni*.

From the above discussion interpretations can be made as follows:

1. Secretion of *kledaka-kapha*, may be correlated with mucous i.e. secreted in buccal cavity, oesophagus & stomach. Because, both having the same functions, like adherent qualities, low resistance for slippage, amphoteric & digestive properties¹⁶.
2. Secretion of *pachaka-pitta* into *pachya-manashaya* (including stomach & intestine up to illium), may be correlated with secretion of gastric & intestinal, viz. pepsinogen, HCl & mucous by oxyntic gland and mucous & gastrin by pyloric gland of stomach, and intestinal enzymes. Cholecystokinin & secretin are secreted from duodenum & jejunum when acidic food passing through them¹⁷.
3. Stimulation of liver & pancreas for secretion of *acchapitta*. The secretion of bile &

pancreatic juice is triggered by cholecystokinin & secretin¹⁸.

4. Secretions of *accha-pitta*, may be resembles with bile & pancreatic juice containing bicarbonate ion & enzymes. Because, secreted during the passing of acidic chyme into the duodenum & jejunum¹⁹.

CONCLUSION: Explaining briefly the digestive and metabolic functions of *Agni*, *Acharya Charaka* has mentioned that various types of dietetic materials are digested by their own *Agni* (*Bhutagni*), encouraged and enhanced by *Antaragni* (*Jatharagni*), which is further digested and metabolized by *Dhatvagni* to associate the body with the nutritional strength, complexion and happy life along with providing energy to the seven *dhatus*. It consist digestive (*pak*) enzymes and different kinds of hormones, and co-enzymes activities etc. which participate in these digestive & metabolic functions. It is a logical conclusion that *Ama* is produced due to hypo-functioning of *Agni*. At any level of the three *Pakas* (digestion and metabolism i.e. *Madhur*, *Amla* & *Katu avastha paka* & *vipaka*) due to hypo-functioning of the *agni* concerned unwanted chemical substances are produced known as *Ama*. Hypo-functioning of any *Agni* especially of *Jatharagni* is likely to affect the function of other too, leading to formation of *Ama* in the different stage of *Paka-karma*. Lastly we can say that *Agni* plays very important role in growth, development & maintenance of the body. In healthy individual during awakening and sleep the *Agni* excited by *Samanavata* due to association of respiration and being blown by *Udanavata*. After digestion by *pachakapitta*, the metabolic products circulate in micro channel under the control of

*Vyanavata*²⁰. The concept of digestion and assimilation of food, more or less similar to modern science in several aspects. *Jatharagni* and *bhutagni* are much close to digestive enzymes because of having less difference in functions and *dhatwagni* is acts at cellular level and play a principle role in assimilation so it may be correlated with the cellular enzymes.

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Source of support: Nil

Conflict of interest: None

Declared