THE PHYSIO ANATOMICAL VIEW OF KLEDAKA KAPHA

Aneeh.T1*, Archana Madhavi2, Swati.S.Bedekar3

1*P.G.Scholar III Year, 2Professor, Dept. of Shareera Rachana, Sri Dharmasthala Manjunatheswara College of Ayurveda, Hassan, Karnataka, India.
3P.G.Scholar II Year, Dept. of Manovijyan Evum Manasaroga, Sri Dharmasthala Manjunatheswara College of Ayurveda, Hassan, Karnataka, India.

KEYWORDS: Kledaka Kapha, gastric mucus, digestion.

ABSTRACT
Dosha, Dathu and Mala form the elemental cause of human body. Our body fails to exist without these three chief constituents. The concept of Tridosha is unique contribution of Ayurveda. They are Vata, Pitta and Kapha. These constitute the anatomical and physiological aspect of human body in general. Kapha is the element which gives stability and endurance to the body. There are 5 types of Kapha according to the location and function. Kledaka is one among them. It is located in Amashaya where the major part of digestion occurs. It is anatomically the stomach. Its function is to moisten and disintegrate the ingested food particles. It also protects the stomach from self digestion. It supports other Kapha sthanas of the body. According to its location and function given in Ayurvedic classics, its role in digestion can be assessed. When we consider the functions; Kledaka Kapha can be correlated with the gastric mucus which is secreted by surface epithelial cells of gastric mucosal layer and cells of gastric glands. The functions of gastric mucus are to lubricate the food particle for the formation of chime and to protect the gastric wall.

The paper is intended to explore the physio anatomical aspect of Kledaka Kapha and its action as gastric mucus and its importance in digestion and metabolism of food.

INTRODUCTION

The presence of Vata, Pitta and Kapha- the Tridoshas in human body is detailed by our Aacharya. The expression of its normalcy is well being and vitiation is disease. The integrated medicine of healing: Ayurveda; advises different preventive and curative practices to maintain the normalcy of the Tridosha in the body and thus keeping individual healthy. So the location, function and attributes of Doshas should be considered. As per this, each Dosa are divided into five.

Kapha, one among the three humors give unctuosness, stability, endurance and helps in binding the joints of body. The two root words from which the term Kapha is derived are ‘ka’ which means water and ‘pha’ which means flourishes. So the humor which originates from water is Kapha. The term can be defined as “kena jalena phalateetti Kapha”- the product of water. It also helps to prosper. The total anabolic events in the human body may be correlated with Kapha, Potential source of strength of the body. The functions are fluid balance, nutrition, tissue binding, immunological and anabolic activities. There are several synonyms for this humor. They are Sleshma, Bala, Valasa, Valasaka, Ojus, soma etc. the synonym Sleshma can be defined as “slish alingane” which means to embrace or keep together.

Mala and Papma are the terms denoted when Kapha is vitiated. This denotes waste materials or disease as such.

The attributes of bodily humors represent the physiology. The Guna of Kapha are Snigdha (unctuousness), Seetha (cold), Guru (heaviness), Manda (dullness), Slekshna (smoothness), Mritsna (sticky), Sthira (firm/immobile), Mridu (softness), Pichila (liminess), the color is Swetha (white). The normal taste is Madhura and Lavana in abnormalcy.

The functions are of Kapha are Snehana (providing unctuousness), Bandhana (binding various structures of body), Sthiratwa (providing stability to the body), Gaurava (promotes bulk of the body), Vishatwa (promoting virility and reproductive ability), Bala (promoting strength), Khama (forbearance), Drithi (power of retention and understanding) and Aloha (greedlessness). Ropana is also a function of Kapha. The Visarga Karma, conservation of strength is done by Kapha.

The locations of Kapha in the body are Uras (chest), Kanda (throat), Sira (head), Kloma (pharynx), Parva (joints), Amasaya (stomach), Rasa Dathu (fluids of body), Medas (fatty content of body), Ghrana (nose/ perception of smell) and Rasana (tongue/ perception of taste). In which the major seat is Uras.
According to function and location it is divided into 5 namely Avalambaka, Kledaka, Bhodaka, Tarpakha and Sleshaka. The one which is located in Amasaya is known as Kledaka Kapha. The present paper deals with the physio-anatomical aspects of the Kledaka Kapha.

Ayurvedic Review

Etymology
The word Kledaka means wetness or moisture. It is the phlegm of the stomach or excessive saliva. In sadhaka druma it is told “kledayathi sleshamadi-bhirithi”.

Location

Ayurvedic classics have no disputes about the seat of Kledaka Kapha. It is located in Amasaya. As further clarification, Chakrapani says that it is the upper part of Amasaya. Susruta opines that it is above the seat of Pitta in Amasaya.

Function

Peetham, Leedam, Khaditham and Asitham are the four mode of ingestion of food. Amasaya receives it and facilitates its easy digestion by the Drava and Snigda guna of Kapha present in it.

So, the main function of Kledaka Kapha is in the digestion. Amasaya is the organ of the body where the major part of digestion process occurs. Kledaka Kapha, which is resides in Amasaya moistens the food particles and help in breaking down its complexity. This is thus the prime function of this Dosha to split the bolus of food and make into smaller particles, making the process of digestion easier.

The Madhura veerya of Kapha and its Seetha guna of Kledaka Kapha aids to protect the Amasaya. The seat of Kapha is situated above Pitta. The primary function of Pitta is heating in an upward direction due to Tejo guna and its Urdwagaami nature. On the other hand Kapha is endowed with a property of cooling. In this Kapha act as Chandra in relation to Aditya (Pitta). Thus the cooling property of Kapha counter the heating property of Pitta. Hence Kledaka Kapha protects the Amashaya from being digested by Pitta.

By the peculiarity of its attributes, Kledaka Kapha enhances the location of all other Kaphasthana in the body. It improves other Kaphasthana by Atmaveerya. The Kittyapaka of Rasadatu is Malaropaka Kapha which is secreted to Amasaya for the purpose of supporting digestion.

Action of Kledaka In Digestive Process

The food which has reached the Jathara is retained there for 2 to 3 hrs. Here quantity of Kledaka Kapha (mucin) and Pachaka Pitta (hydrochloric acid) increase considerably Kledaka Kapha in the beginning and Pachaka Pitta afterwards. Kledaka Kapha (mucin) breaks down the food material in to finer particles (Bhinna-sanghata), soaks it thoroughly and imparts the necessary fluid consistency (Klinikta) so that Pachaka Pitta can penetrate into every particle of food and bring about Paka. This phase of predominance of Kapha is called Madhura-avastha Paka and is the first phase of Ahara Paka. After this, the fraction of Pachaka Pitta which has increased by this time initiates the second phase known as Amla-avastha Paka or Shukta Paka. The Pitta enters into the finer particles of food and brings about Paka in both its aspects - Parinama (physical change) and Pravritti (chemical change). When Amlabhava has reached its maximum, Grahani-dwara Mudrika (pyloric sphincter) opens allowing food to pass slowly into Grahani. Actions of two Mudrika and contraction of Jathara helps in increased production of Kledaka Kapha and Pachaka Pitta is stimulated by Samana Vayu.

Hence Kledaka Kapha is having 3 main functions
1) Disintegration and moistening
2) Supports other Kapha
3) Protective function

Modern Review

The mammalian stomach is a specialized organ of the digestive tract that serves as reservoir of ingested food and process food for subsequent intestinal absorption. Gastric juice contains hydrochloric acid, one of the most corrosive acids known. The gastric acid is capable of dissolving zinc and is deadly to cells. Yet in the stomach, hydrochloric acid ordinarily acts only to perform the useful functions of killing ingested bacteria, softening fibrous foods, and promoting pepsin production. The corrosive juice is prevented from attacking the stomach wall by a complex physico-chemical barrier termed the gastric mucosal barrier (GMB).

The presence of acid in the stomach results in small acid back-diffusion into the mucosa in exchange for Na+ ions that define the permeability characteristics of the gastric mucosa. The gastric mucosal surface, which is covered by a mucus gel, secretes bicarbonates into this adherent mucus layer to neutralize luminal H+ ions diffusing towards the mucous epithelial cells. This prevents their damaging action. Tight junctions between adjacent epithelial cells, constant secretion of mucus-HCO3 – produce a continuous protective “blanket” of 200-300 µm thickness on their surface and abundant blood flow in the mucosa form together, “the mucosal barrier”.

The gastric mucous membrane is described as being disposed in three regions, known as the cardiac, fundic, and pyloric. These regions, although distinguished from one another by definite microscopic characters, yet merge gradually the one into the other, so as to present no well-defined lines of demarcation. The barrier cannot be defined on a strictly anatomic basis, but is rather a collection of interdependent physical and chemical processes that act in concert to protect the gastric mucosa against secreted acid and pepsin.

Gastric glands

In the surface of gastric mucosa, the lining cells are called surface epithelial cells which occupy the surface in between the gastric glands, secrete: (1) mucus and (2) some bicarbonate rich(alkaline) secretion and the alkaline mucus has a strong role in preventing auto digestion of the gastric mucosa by the acid pepsin mixture (APM).

When the stomach is empty the thick gastric mucosa is thrown into numerous longitudinal folds
called as Rugae. These rugae will be disappeared once when the stomach become full. Thick viscid mucus (about 2mm thick) normally lies over the mucosa of the stomach.

The gastric mucosa is divided into three areas:
1. Cardiac glandular areas (occupying the cardiac region)
2. oxyntic glandular areas (occupying the body)
3. pyloric glandular (occupying the pyloric region) areas.

Cardiac glandular region contains cardiac glands which secrete mucus. Oxyntic glands are the most important and most numerous of the gastric glands. Several oxyntic glands open by a common opening called gastric pit, into the lumen of the stomach. Each glands contains several type of cells.
1. mucous neck cells found in the neck region, secreting mucus,
2. parietal or oxyntic cells, secreting HCL and intrinsic factor(IF) and
3. peptic or chief cells, which contain zymogen granules, secrete pepsinogen-the precursor of pepsin.

Mucus produced by surface epithelial cells is viscid whereas that produced by the mucous neck cells is thin.

Function of gastric mucosa
The gastric mucosa is exposed to two kinds of injury:
1. Mechanical injury due to rubbing of food stuffs, and
2. Auto digestion of the gastric mucosa by the APM.

Protection Against Mechanical Injury
The thick viscid mucus which coats the mucosal epithelium gives a mechanical protection. Further, in spite of this, in some areas of the mucosa, the mucus may be removed and the underlying epithelium damaged. But, due to continuous production of mucus by surface epithelial cell and gastric movements the spot again becomes covered by mucus. Mucus is a combination of mucin (a glycoprotein) and water.

Protection Against Auto digestion
The gastric mucosal surface epithelium secretes
1. Mucus, and
2. HCO₃⁻ ions.

The viscid mucus overlies the gastric mucosa and as it does not move or get stirred easily, it is called the unstirred layer. Entrapped within this unstirred layer of mucus are HCO₃⁻ ions. In gastric lumen, the pH is about 2.0 so that pepsin is active and can digest the food protein. But in the region, where the viscid mucus is adjacent to surface epithelial cells, the pH is about 7.0 because:
1. The HCL cannot penetrate the unstirred layer rapidly
2. The HCL which does penetrate the viscid mucus, reacts with HCO₃⁻ to produce CO₂ and thus the pH rises.

Gastric mucosa is daily exposed to the potential ravages of acid and pepsin, a wide variety of potentially damaging agents that include certain foods, a range of temperatures, hyperosmolar and abrasive substances, chemical damage from refluxed bile and pancreatic juice, as well as to bacterial toxins and a variety of potentially damaging drugs. Some damage is inevitable under these circumstances, yet the gastric mucosa normally retains its integrity even under these attacks.

At pH 7.0, the pepsin becomes inactive and therefore, the mucosal epithelium remains unharmed¹⁷.

DISCUSSION
The three forces which can be recognized in the external world are Soma (moon or water), Surya (sun) and Anila (air) with their actions Visarga, Adana and Vikshepa respectively. Similarly the body is maintained by three humors viz. Kapha, Pitta and Vata having the same qualities and actions respectively¹⁸.

The Kapha that which located in the Amasaya viz. stomach is known as Kledaka Kapha. Kledaka name is given to the Kapha which is present in Amashaya because it moistens the food. The substance which is secreted into stomach and with physical characteristics similar to Kapha is gastric mucus. Mucus is composed mainly of water, electrolytes and a mixture of several glyco proteins.

According to Acharya Susrutha Amasaya is above Pittasaya where as Chakrapani explains the Kledaka is the upper part of Amasaya i.e., Urdhwamaya and lower part (Adhomasya) is the seat of Pitta¹⁹.

Kledaka karma: The food particle which reaches Amasaya is lubricated by Kledaka Kapha. The food molecules are liquefied by gastric mucus in stomach. Hence the function of Kledaka Kapha and gastric mucus are same.

Bhinna Sanghatha: both Kledaka Kapha and gastric mucus disintegrate the food particles by loosening it.

Chandra iva aditya: Kledaka is situated in the Urdhwa Amasaya and Pitta which is in Adhoamasya. As the Pitta is Urdwagami there are chances of Amasaya being digested by it. Kledaka Kapha provides a protection against this auto digestion as its qualities opposes that of Pitta. Gastric mucus protects the stomach wall from being digested by strong acids.

Mucus layer on gastric surface forms a mucosal barrier to damage against several forms of potential injury to the gastric mucosa¹⁷. The gastric mucus is:
1. A gel 0.2mm thick; 80% CHO; 20% protein
2. Secreted by neck cells, surface epithelium
3. Can be cleared by pepsin, so continual production is required
4. Release is stimulated by acetylcholine from nerve endings
5. Also rich in bicarbonate
   a. HCO₃⁻ content creates a "micro-environment" around surface cells to prevent acid damage
   b. HCO₃⁻ secretion is inhibited by adrenergic input (prominent in stress)

Thus the property of Kledaka Kapha in complimenting the other Kapha Sthana of the body by helping initial stages of digestion and protecting the stomach can be understood.
How the pH is Maintained in Acid Exposure?

Studies have undergone in human and animal models on the pH of gastric mucosa and its action in auto-digestion. The pH gradient in the mucus gel restrains back-diffusion of luminal acid. The existence of the pH gradient is made possible by bicarbonate transported by the blood flow from the acid secreting parietal cells to the surface epithelium, where a DIDS (4'-diisothiocyanostilbene-2,2'-disulfonic acid)-sensitive bicarbonate transport through the epithelium occurs. Prostaglandin-dependent bicarbonate secretion seems to be less important in maintaining a neutral pH. Of the mucus gel layers, only the firmly adherent one is important for the pH. Accordingly, the pH gradient is found in the 80μm thick mucus gel layer closest to the mucosa. Secreted acid penetrates the mucus gel through specific channels only. Thus, a pH gradient with a neutral pH can still exist during acid secretion. Gastric mucosal blood flow increases on application of strong luminal acid.

Breaking the mucosal barrier represents an initial step in the process of mucosal injury with a subsequent cascade of liberation of histamine and histamine-like substances, overt mucosal bleeding, acute gastritis and several other disorders associated with it.

Similarly the pathology of gastro intestinal diseases in Ayurveda such as Grahani roga also shows derangement of Kledaka kapha along with Pachakagni and Samana vayu.

CONCLUSION

- Kledaka Kapha is anatomically located in Urdhwasamaya.
- It can be considered as gastric mucus which is secreted by surface epithelial cells of gastric mucosal layer and cells of gastric glands.
- The functions of gastric mucus are to lubricate the food particle for the formation of chime and to protect the gastric wall.
- Kledana is the basic function of Kledaka Kapha. Along with it, causes Bhimna Sanghatha (disintegration of food particles) and Chandra iva Aditya (protection of stomach wall).
- Hence the functions and locations of Kledaka Kapha can be correlated with that of gastric mucus.

REFERENCES

18. Teorell T. On the permeability of the stomach mucosa for acid and some other substances. J Gen Physiol 1940; 97: 308-314.

Cite this article as:

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