

A CRITICAL REVIEW OF BODHAKA KAPHA IN MODERN PHYSIOLOGICAL PERSPECTIVE

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ABSTRACT

Ayurveda describes the *Doshas* as three fundamental principles operating in outer nature but also penetrating our human nature and thus regulating all physiological processes. *Kapha Dosha* is one of the functional units of the body. *Kapha* is functionally subdivided into five types i.e. *Avalambaka*, *Kledaka*, *Bodhaka*, *Tarpaka* and *Sleshaka Kapha* etc. *Bodhaka* is located at the root of tongue and throat, it helps in the perception of taste because of the gustatory sense organ being watery in nature. According to modern science, taste is a chemical sensation. Saliva by its solvent action dissolves the solid food substances, so that the dissolved substances can stimulate the taste buds. The stimulated taste buds recognize the taste. Taste is impaired when the mouth is dry, because substances can only be tasted when in solution. The present article aims to study the similarities among saliva and *Bodhaka Kapha* according to modern and ancient aspect.

Keywords: *Dosha*, *Kapha*, *Bodhaka Kapha*, saliva, taste perception.

INTRODUCTION

Sarira is a living body. The different constituents of the body are grouped into three principle categories, namely *Dosha*, *Dhatu* and *Mala*. Ayurveda considers no entity other than these three constitutional elements of the living body¹. *Vata-Pitta-Kapha Doshas*, *Rasa-Rakta-Mamsa-Meda-Asthi-Majja-Sukra Dhatus* and *Purisha-Mutra-Sweda Malas* are like roots of living body. As roots are vital for trees amongst other organs like stem, branches etc. these *Dosha-Dhatu-Mala* are essential for human body². *Ayurveda* describes the *Doshas* as three fundamental principles operating in outer nature but also penetrating our human nature and thus regulating all physiological processes³. These

three *Doshas* are made up of five elements: *Vata* comprises air and space, *Pitta* comprises fire and water, and *Kapha* water and earth. The Balance of these entities represents the healthy state and imbalance will cause various diseases⁴. *Kapha Dosha* is one of the functional units of the body. *Kapha* is functionally subdivided into five types i.e. *Avalambaka*, *Kledaka*, *Bodhaka*, *Tarpaka* and *Sleshaka Kapha*⁵. *Bodhaka* is located at the base of tongue and throat⁶. It is responsible for the perception of taste because of the gustatory sense organ being watery in nature⁷. Ayurveda has described six different taste (*Rasas*)⁸. *Jala* is *Yoni* of *Rasas* i.e.⁹ *Rasa* perceives when it dissolves in water or saliva. *Kapha* is

also said as *Bala*¹⁰, it is responsible for *Vyadhikshamatva* i.e. fighting against the pathogens.

Saliva – It is watery opalescent, tasteless secretion, secreted by the three pairs of salivary glands viz the parotid, sub-maxillary (also called sub-mandibular) and sublingual. Of total salivary secretion, 70% is secreted by submandibular, 25% is secreted by parotid and 5% by sublingual glands. The parotid gland secretion is very rich in salivary amylase, a starch splitting enzyme, but comparatively poor in mucin, whereas the secretion of sublingual and sub maxillary, particularly the sublingual gland is rich in mucin but poor in enzyme.¹¹

Structure and duct system of salivary glands – Salivary glands are formed by acini or alveoli. Each acinus is formed by a small group of cells which surround a central globular cavity. Central cavity of each acinus is continuous with the lumen of the duct. The fine duct draining each acinus is called intercalated duct. Many intercalated ducts join to form intralobular duct. Few intralobular ducts join to form interlobular ducts, which unite to form the main duct of the gland.¹²

Total amount – 1200-1500 ml in 24 hours. A large proportion of this 24-hour volume is secreted at mealtime, when secretory rate is highest.¹³

Consistency – Slightly cloudy, due to the presence of cells and mucin.¹⁴

Reaction – Usually Slightly acid (pH 6.02-7.05). On standing or boiling it loses CO₂ and becomes alkaline. This alkaline reaction causes precipitation of salivary constituents, as tartar on the teeth or calculus in salivary duct.¹⁵

Specific gravity¹⁶ – 1.002-1.012.

Freezing point¹⁷ – 0.07-0.34°C

Composition¹⁸–

- Water – 99.5%
- Solid – 0.5
- Organic substances
 - Enzymes - Amylase (Ptyalin), Maltase, Lingual lipase, Lysozyme, Phosphatase, Carbonic anhydrase, Kallikrein.
 - Other organic substances – Mucin, Albumin, Proline-rich protein, Lactoferrin, IgA, Blood group antigens, Free amino acids, Non-protein nitrogenous

substances- urea, uric acid, creatinine, xanthine, hypoxanthine.

- Inorganic substances- Sodium, Calcium, Potassium, Bicarbonate, Bromide, Chloride, Fluoride, Phosphate.

- Gases – Oxygen, Carbon dioxide, Nitrogen etc.

Function of saliva¹⁹–

1. Protects the lining of oral cavity by keeping it moist and diluting the irritant if any.
2. Helps in sensation of taste by dissolving and keeping the constituents in solution.
3. Lubricates the food, makes the food as bolus form and thus facilitates the act of mastication and swallowing.
4. It makes the taste bud to respond to sweet, salt, acid and bitter substance.
5. Keeps the mouth and teeth clean and free of food debris. In addition bacterial action of lysozyme in saliva guard the teeth etc. against infection.
6. Mucin present in the saliva protects the mouth by lubricating the mucous membrane of the mouth.²⁰
7. Proline-rich protein, lactoferrin present in saliva possess antimicrobial property.²¹

Taste buds²² – Taste is a chemical sense. Taste buds are sense organs for taste or gustatory sensation. The stimulated taste buds recognize the taste.

Situation of taste buds²³ – Most of the taste buds are present on the papillae of tongue. Taste buds are also situated in the mucosa of epiglottis, palate, pharynx and the proximal part of esophagus.

Types of papillae²⁴ –

- Circumvallate papillae
- Fungiform papillae
- Filiform papillae

Types of cells in taste buds²⁵ – The cells (taste cells) within the taste buds are of two types: gustatory receptor cells and supporting or sustentacular cells. The taste cells are formed from the epithelial cells surrounding the taste bud and migrate towards the center as they mature and finally degenerate in about 10 days. It is presumed that all the cells in the taste bud are sensory but in different stages of development. However, only gus-

tatory receptor cells make synaptic connection to sensory nerve fibers. Each gustatory receptor cells ends in 'microvilli' at the top near the pore.

Pathway for taste²⁶ –

- **Receptors** – Receptors for taste sensation are the gustatory receptor cells of taste buds. Each taste bud is innervated by about 50 sensory nerve fibers and each nerve fiber supplies at least five taste buds through its terminals.
- **First order neuron** - first order neurons of taste pathway are in the nuclei of three different cranial nerves, situated in the medulla oblongata. Dendrites of the neurons are distributed to the taste buds. After arising from taste buds, the fibers reach the cranial nerve nuclei by running along the following nerves:
 1. **Chorda tympani fibers** of facial nerves, which run from anterior two third of tongue.
 2. **Glossopharyngeal nerve fibers**, which run from posterior one third of the tongue.
 3. **Vagal fibers**, which run from taste buds in other regions.

Axons from first order neurons in the nuclei of these nerves run together in medulla oblongata and terminate in the nucleus of tractus solitaries.

- **Second order neuron** - Second order neurons are in the nucleus of tractus solitaries. Axons of second order neurons run through medial lemniscus and terminate in posteroventral nucleus of thalamus.
- **Third order neuron** - Third order neurons are in the posteroventral nucleus of thalamus. Axons from third order neurons project into parietal lobe of the cerebral cortex.
- **Taste center** – Center for taste sensation is in opercular insular cortex, i.e. in the lower part of post-central gyrus, which receives cutaneous sensations from face. Thus, the taste fibers do not have an independent cortical projection.

Taste transduction²⁷ - Taste transducer is the process by which taste receptor converts chemical energy into action potentials in the taste nerves fibers. Receptors of taste sensation are chemoreceptors, which are stimulated by substances dissolved in mouth by saliva. The dissolved substances act on microvilli of taste receptors

exposed in the taste pore. It causes the development of receptor potential in the receptor cells. This in turn, is responsible for the generation of action potential in the sensory neurons.

DISCUSSION

Dosha, Dhātu, Mala together form the basis of the body. The balance of these entities represents the healthy state and imbalance will cause various diseases. There are five types of *Kapha* namely *Bodhaka, Sleshaka, Tarpaka, Avalambaka, Kledaka*. Subtype of *Kapha* which informs, reveal, awaken, arouse or denote the tastes present in different types of substances is called *Bodhaka Kapha*. Chief function of *Bodhaka Kapha* is *RasaBodhana* i.e. perception of taste.

Rasa Bodhana – perception of taste

Taste is a chemical sensation. Taste buds contain sensory receptors (chemoreceptors) that are found in the papillae of the tongue and widely palate, pharynx and epiglottis. They consist of small sensory nerve endings of the glossopharyngeal, facial, and vagus nerves. The sensory receptors are stimulated by chemicals that enter the pores dissolved in saliva. Taste is impaired when the mouth is dry, because substances can only be tasted when in solution. Nerve impulses are generated and conducted along the glossopharyngeal, facial and vagus nerves before synapsing in the medulla and thalamus. Their destination is the taste area in the parietal lobe of the cerebral cortex where taste is perceived.²⁸ So, here saliva is acting as an instructor for perception of taste. By this function we can correlate *Bodhaka Kapha* with saliva.

Bodhaka Kapha – Digestion

When food is taken into the mouth, it is moistened and dissolved by saliva. The mucin of saliva lubricates the bolus and facilitates the swallowing. Saliva has three digestive enzymes namely, salivary amylase, maltase and lingual lipase. It helps in digestion²⁹. So, *Kapha* which is present in the oral cavity or saliva which does the *Kledana*/softening of the food can be correlated with *Bodhaka Kapha*.

Bodhaka Kapha – Vyadhikshamatva

Due to the constant secretion of saliva, the mouth and teeth are rinsed and kept free off food debris, shed epithelial cells and foreign particles. In this way, saliva prevents bacterial growth by removing materials, which may serve as culture media for the bacteria growth. The enzyme lysozyme of saliva kills some bac-

teria such as staphylococcus, streptococcus and brucella. The proline rich proteins and lactoferrin present in saliva possess antimicrobial property³⁰. This is related to *Vyadhikshamatva* property of *Bodhaka Kapha*. By this some factor we can correlate the *Bodhaka Kapha* with saliva.

Criteria	<i>Bodhaka Kapha</i>	Saliva
Location	<i>Rasana</i>	Oral cavity
Composition	<i>Sowmya Guna</i>	99.5% water
Main function	<i>Rasa Bodhana</i>	Appreciation of taste

CONCLUSION

The *Kapha*, situated at the root of tongue and throat is known as *Bodhaka Kapha*. It has *Sowmya* properties³¹. The main function of *Bodhaka Kapha* is said to be *Rasabodhana* i.e. perception of taste. Taste is a chemical sensation. Saliva by its solvent action dissolves the solid food substances, so that the dissolved taste buds recognize the taste. *Kapha* is also said as *Bala* & is responsible for *Vyadhikshamatva* i.e. fighting against the pathogens. In modern physiology the *Bodhaka Kapha* can be correlated with saliva helps not only in taste perception but also in other way.

REFERENCES

1. Dr. nandini Dilip Dhargalkar part-1, Sarira-kriya-vidhana Chaukhamba Sanskrit series office Varanasi, Edition-5th, Reprint-2018, page no.83.
2. Dr. nandini Dilip Dhargalkar part-1, Sarira-kriya-vidhana Chaukhamba Sanskrit series office Varanasi, Edition-5th, Reprint-2018, page no.86.
3. Dr. Anant Ram Sharma, Acharya Priya Vrat Sharma, Sutra Sthana chapter 21 verse 8, Sushruta Samhita of Maharsi Sushruta, Reprint edition-2010, Chaukhamba surbharti prakashan Varanasi, page no. 179.
4. Kaviraj Atrideva Gupta vol 1 Sutra sthana chapter 20 verse 3 Astanga Sangraha with the commentary Chowkhamba krishnadas academy Varanasi, Reprint – 2011-page no. - 160.
5. Pt. Hari Sadasiva Sastri Paradakara Bhisagacarya, Sutra Sthana chapter 12 verse 15 Astangahrdaya of Vagbhata, with the coomentaries Sarvangasundara of Arunadatta, Chaukhamba surbharati prakashan, Varanasi, Reprint-2014, page no. 194.
6. Dr. Anant Ram Sharma, Acharya Priya Vrat Sharma, Sutra Sthana chapter 21 verse 14, Sushruta Samhita of Maharsi Sushruta, Reprint edition-2010, Chaukhamba surbharti prakashan Varanasi, page no. 182.
7. Anne Waugh, allusion grant, Ross and Wilson anatomy and physiology in health and illness, ELSEVIER, Reprint – 2011, international edition ISBN page no. – 201.
8. Dr.Brahmanand Tripathi, elaborated by Charaka & Drdhabala Viman Sthana chapter 1 verse 4, Charaka Samhita of Agnivesa vol I, Charaka-chandrika hindi commentary Reprint – 2009.page no. – 656.
9. Vd. Harishchandra Singh Kushwaha, Sutra Sthana chapter 26 verse 9, Charak Samhita Ayurveda –Dipika's Ayusi hindi commentary Reprint Edition: Edition – 2018, page no. 366.
10. Dr. Brahmanand Tripathi, elaborated by Charaka & Drdhabala Sutra Sthana chapter 17 verse 117, Charaka Samhita of Agnivesa vol I, Charaka-chandrika hindi commentary Reprint – 2009.page no. – 365.
11. Dr. Chitta Ranjana Das, A textbook of physiology volume -1, chaukhamba Sanskrit pratishthan delhi, reprint – 2019-page no.107.
12. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brother's medical publication (P) Edition sixth -2013, page no. -224.
13. Chandi Charan Chatterjee, Human physiology volume 1, CBC Publishers, Eleventh Edition: 1985, reprint 2016, Page no. 415.
14. Chandi Charan Chatterjee, Human physiology volume 1, CBC Publishers, Eleventh Edition: 1985, reprint 2016, Page no. 415.
15. Chandi Charan Chatterjee, Human physiology volume 1, CBC Publishers, Eleventh Edition: 1985, reprint 2016, Page no. 415.

16. Chandi Charan Chatterjee, Human physiology volume 1, CBC Publishers, Eleventh Edition: 1985, reprint 2016, Page no. 415.
17. Chandi Charan Chatterjee, Human physiology volume 1, CBC Publishers, Eleventh Edition: 1985, reprint 2016, Page no. 415.
18. K Sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology, Jaypee brother's medical publication (P) Edition sixth, -2013, page no. -213.
19. Dr. Chitta Ranjana Das, A textbook of physiology volume -1, chaukhamba Sanskrit pratishthan Delhi, reprint - 2019 page no.107.
20. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brother's medical publication (P) Edition sixth -2013, page no. -214.
21. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brothers medical publication (P) Edition sixth -2013, page no. -214.
22. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brothers medical publication (P) Edition sixth -2013, page no. -214.
23. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brothers medical publication (P) Edition sixth -2013, page no. -214.
24. A textbook of Sharira-kriya vigyan, part-2 by prof. Dr. Subhash Ranade, prof. Dr. R.R. Deshpande, Dr. Swati chobhe, chaukhamba Sanskrit pratishthan, reprint - 2012 page no.168.
25. Prof. A K. Jain, Textbook of Physiology volume - 2, Avical publishing company, Reprint edition- 4th, page no. 1090.
26. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Edition sixth -2013, page no. -982.
27. K sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology, Edition sixth -2013, page no. -982.
28. Ross and Wilson anatomy and physiology in health and illness written by Anne Waugh, allusion grant, Reprint - 2011, page no. - 201-202.
29. K Sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brother's medical publication (P) Edition sixth -2013, page no. -214.
30. K Sembulingam (PhD) and Prema Sembulingam (PhD), Essentials of medical physiology Jaypee brother's medical publication (P) Edition sixth -2013, page no. -214.
31. Dr. Anant Ram Sharma, Acharya Priya Vrat Sharma, Sutra Sthana chapter 21 verse 14, Sushruta Samhita of

Maharsi Sushruta, Reprint edition-2010, Chaukhamba surbharti prakashan Varanasi, page no. 182.

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