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PHYSIOLOGY OF UDAKAVAHA SROTAS W.S.R. THIRST

Ayurveda

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ABSTRACT

Background- The Ayurvedic concept of Udakavaha Srotas, rooted in Talu (palate) and Kloma, reflects an advanced physiological model of water transport and thirst regulation. Talu corresponds to oropharyngeal receptors sensing dryness, while Kloma parallels central regulatory centers like the hypothalamus. This alignment underscores Ayurveda's early recognition of fluid homeostasis mechanisms relevant to modern physiology. **Objective-** To explore the physiological of Talu and Kloma in the regulation of Ṭri h a through their role in Udakavaha Srotas. Material and **Methods**- This review integrates classical Ayurvedic texts namely Charaka Samhita, Sushruta Sa hita, and Astanga Hridaya—with contemporary anatomical and physiological research on fluid homeostasis, osmoregulation, and the neurobiology of thirst. Discussion- Srotas are basic channels that regulate physiological functions in the human body, according to the ancient Ayurvedic and modern system. Moola sthana of Udakavaha Srotas, Talu and Kloma, Talu functions as the primary sensory site for dryness, corresponding to oropharyngeal receptors signaling dehydration. Kloma likely represents neuroendocrine structures, including the hypothalamic thirst center. Together, they regulate fluid homeostasis. Vitiation of Udakavaha Srotas leads to impaired thirst control, seen in conditions like diabetes insipidus and dehydration, paralleling Ayurvedic and modern concepts. Conclusion- Talu and Kloma Fundamental roots of Udakavaha srotas reveals a conceptualization of thirst and water regulation, congruent with modern physiological mechanisms.

KEYWORDS

Ayurveda, Srotas, Talu, Kloma, Udakavaha, Thirst

INTRODUCTION-

Dosha Dhatu Mala Moolam hi Shariram[1], The human body comprises three essential physiological components *Dosha, Dhatu, and Mala*, that are crucial for sustaining health and balance. To transport system is required to carry these substances from their source to their sites of action. This system is known as *Srotas*, the intricate network of channels that facilitate the movement and distribution of vital materials throughout the body. The human body is composed of an intricate system of *Srotas* (channels). *Acharya Sushruta* enumerates eleven pairs of these channels, while *Acharya Charaka* describes thirteen pairs.

Srotas provide a comprehensive framework for understanding all processes of exchange, transport, and excretion occurring in the human body, at both macro and micro levels. Each *Srotas* has two *Moola Sthana*, which are primarily responsible for the generation and regulation of the substances flowing through them. According to *Chakradatta*, *Srotomoola* refers to the origin or foundational point of the *Srotas*. Much like the root of a tree, it is considered the most vital part of the system. Any pathology within a *Srotas* typically begins at its *Moola Sthana*, where the earliest signs and symptoms of disease manifest. ***Udakavaha Srotas*** are the physiological channel responsible for the regulation and transportation of water (*Udaka*) within the body. The ***Moola Sthana*** of these *Srotas* are the ***Talu*** (palate) and ***Kloma*** - an organ variably interpreted, but generally associated with structures involved in thirst regulation and fluid balance.

According to *Acharya Charaka* and *Sushruta*, the *Moola* or root of *Udakavaha Srotas* is described as *Talu* and *Kloma*. The identification of *Talu* / *Taluka*, however, has been the subject of different interpretations[2]. *Talu* is considered the palate, the roof of the oral cavity, which lies in contact with the upper surface of the tongue. Since thirst (*Trishna*) is perceived first in the mouth and palate, this interpretation is functionally significant, linking *Talu* with the sensory site for water regulation. The most widely accepted interpretation links it with respiratory and upper digestive organs such as the trachea or lungs, given their pivotal role in moisture, fluid distribution, and internal balance. Taken together, these interpretations suggest that *Talu* represents the perceptual and central aspect of thirst regulation, while *Kloma* represents the structural organs responsible for fluid management and distribution in the body. Thus, both sites together cover the sensory signaling and physiological execution in the understanding of *Udakavaha Srotas*. *Tilakam* is also described as a *Paryaya* of *Kloma* [3]. *Kloma* has been correlated with *Phupphusa* by some *Acharya*. *Kloma* has been correlated with *Swasanalika* (trachea) by *Acharya Gananath* Sen [4].

Kloma indicates in *Charaka Samhita, Antar Vidradhi* and symptoms are *Pipasa* - thirst, *Mukha Shosha* - mouth dryness. Excessive thirst and dryness of the tongue, palate, lips, throat, and *Kloma* are the signs of the infection[5]. One should be able to determine if the *Udakavaha Storats* are impacted by these symptoms[6].

Udakavaha srotas get vitiated by fear, excess of alcoholic drinks, dry foods, suppression of thirst etc. The signs of its vitiation are severe thirst, dryness of mouth, ringing in ears and unconsciousness[7]. When srotas get obstructed (blocked), damaged, injured that is vitiated, it causes the symptoms as follows, *Pipasa* - severe thirst, *Sadhyomaran* - death (when there is water deficit or imbalance for a long duration and has not been compensated) According to *Charaka* symptoms are as follows[8] . *Jivha Shosh* - Dryness of emaciation of tongue, *Talu Shosh* - Dryness of emaciation of palate. *Oshtta Shosh* - Dryness of emaciation of lips. *Kloma Shosh* - Dryness of emaciation of Trachea (windpipe), Pharynx, Pancreas or water regulating centers in the brain. *Kantha Shosh* - Dryness of emaciation of throat. *Atipravriddha Pipasa* - Severe thirst. *Talu* or palate is the first part of body which indicate want of water in the form of thirst. The perception of thirst is first perceived at the level of the palate (*Talu*), which is therefore regarded as one of the *Moolasthana* of *Udakavaha Srotas*. Thirst is regulated by osmoreceptors situated in the hypothalamus. Osmoreceptors responsible for generating the sensation of thirst are the same as those controlling the release of antidiuretic hormone (ADH), although both are located in closely related regions of the hypothalamus. The osmotic threshold for the stimulation of thirst is considered to be slightly higher than that for ADH secretion; however, this remains a matter of debate. Thirst may be defined as the conscious perception of fluid requirement, primarily arising in response to dehydration[9].

Aim

- To study and explore the physiology of *Talu* and *Kloma* w.s.r. thirst mechanism.

Objectives

- To analyze the *Moola Sthan*, causes (*Nidana*) and symptoms (*Lakshana*) of *Udakavaha Srotas Dushti* w.s.r to thirst physiology.

- To analyse the thirst physiology with the role of hypothalamus from both modern research sources and traditional ayurvedic texts.

Material & Method

The study was conceptually organized utilizing literary analysis of both contemporary and classical sources. The concepts in the title were assembled from contemporary textbooks, Ayurvedic literature, a variety of scientific periodicals, the internet, and analysis.

DISCUSSION

The *Prabhava Sthana* of *Udakavaha Srotas Talu* and *Kloma*, *Kloma* has been described as a *Koshtanga* by *Acharya Charaka*, *Vagbhata*, *Kashyapa* and *Bhela*[10,11,12,13]. According to these, it is included among the internal visceral organs situated within the *Koshta*. *Kloma* is described as an *Avayava* situated in the *Kukshi*, positioned inferior and slightly to the right of the *Hridaya*, and morphologically resembling a *Mamsapindakaara*. It is considered an important *Pipasa Sthana* and plays a key role in the manifestation and regulation of *Trishna* (thirst). Being associated with thirst perception, *Kloma* contributes significantly to the maintenance of fluid balance and equilibrium of *Jala Mahabhuta* in the body. *Kloma* has been correlated with *Phupphusa* by some *Acharya*. *Phupphusa* is an *Avayava* situated in the *Koshta*, positioned below and to the left of the *Hridaya* along with *Pleeha*. It may be described either as located inferior and to the left of the *Hridaya* (*Adho Vamataha*) or simply to the left of the *Hridaya* (*Kevala Vamataha*). *Phupphusa* is considered to be derived from *Shonita Phena* and serves as the *Adhara* of *Udana Vayu*. In the RAAS system, ACE (Angiotensin-Converting Enzyme) is secreted by the lungs and plays an important role in maintaining fluid and electrolyte balance. *Tilakam* is mentioned as a *Paryaya* (synonym) of *Kloma*. *Tilakam* is described as a *Paryaya* of *Kloma*. Based on morphological similarity, correlate *Kloma* with the pancreas, as its shape resembles that of *Tilakam*. The pancreas plays a vital role in the secretion of digestive enzymes as well as ins the regulation of blood glucose levels. In pathological conditions such as diabetes mellitus, particularly diabetic ketoacidosis, there is accumulation of ketone bodies and lactic acid in the blood along with excessive loss of water and electrolytes through urine. This results in dehydration, hypovolemia, and may progress to shock. Thus, although the pancreas does not directly regulate fluid balance, its dysfunction can significantly disturb fluid and electrolyte homeostasis, which may be correlated with derangement of *Udakavaha Srotas*.

Udakavaha Srotas is related with body fluid[14]. So in the *Udakavaha Srotodushti* (vitiation), thirst (*Pipasa*) is a natural manifestation. *Kloma*, described as a *Pipasa Sthana* and a component of *Udakavaha Srotas*, may be functionally correlated with the hypothalamus, which serves as the principal regulatory center for thirst and fluid balance. Furthermore, the suprarenal glands play a critical role in maintaining fluid and electrolyte homeostasis through the secretion of aldosterone, which regulates extracellular fluid volume and osmolarity. Deficiency of aldosterone leads to severe electrolyte imbalance, reduction in blood volume, hypotension, and may ultimately result in circulatory collapse and death.

A decrease in plasma volume and an increase in plasma osmolality act as primary stimuli for the activation of the thirst mechanism. Reduction in plasma volume leads to a fall in arterial blood pressure, which in turn stimulates the renin-angiotensin system, resulting in increased formation of angiotensin II, a potent dipsogenic agent that directly acts on the hypothalamic thirst center. Simultaneously, increased plasma osmolality is detected by osmoreceptors located in the hypothalamus, which are highly sensitive to even minor changes in osmotic concentration. This hyperosmolar state also leads to decreased salivary secretion, producing dryness of the mouth, which further augments the sensation of thirst. These combined stimuli activate the hypothalamic thirst center, generating a conscious desire to drink water. Following water intake, receptors in the oropharynx, stomach, and intestine are stimulated, leading to rapid, short-term inhibition of thirst even before significant changes occur in plasma osmolality[15]. Subsequently, absorption of water into the bloodstream restores plasma volume and reduces plasma osmolality, thereby providing long-term regulation and negative feedback to the thirst center. This integrated mechanism ensures precise maintenance of fluid balance and osmotic homeostasis in the body.

CONCLUSION

Udakavaha Srotas are fundamental to the maintenance of fluid homeostasis and survival. Their *Moolasthana*, *Talu* and *Kloma*, serve as critical regulatory sites for body water balance. Vitiation or injury to these channels results in pathological thirst, dehydration, and potentially fatal outcomes such as *Sadyomarana*. The Ayurvedic concept of *Trishna*, characterized by *Pitta-Vata* predominance, shows a close parallel with modern physiological states of hypovolemia and hyperosmolarity mediated through neurohormonal mechanisms such as the renin-angiotensin system. *Udakavaha Srotas* is essential for maintaining physiological equilibrium and preventing life-threatening disturbances.

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