



CRITICAL APPRAISAL OF HOMEOSTASIS WITH ITS INTERPRETATION IN AYURVEDA

Dr. Spoorthi Prasad H M*

PG Scholar, Sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital, Hassan, Karnataka, India *Corresponding Author

Dr. Bhuvana C S

PG Scholar, Sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital, Hassan, Karnataka, India

Dr. Nagaraj Kamath

Associate professor, Sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital, Hassan, Karnataka, India

ABSTRACT

Homeostasis is the maintenance of relatively stable conditions in the body's internal environment in a range that is compatible with maintaining life. Healthy living depends on the constant maintenance of the internal environment within set limits. If it goes beyond the limits, body exhibits malfunction and manifests infirmity and illness. The physiological mechanisms which work to stabilize the internal environment are called homeostatic mechanisms achieved by positive and negative feedback signals and three working components namely detector, integrating center and effector. Ayurveda describes many principles for maintaining health like theory of similarity and dissimilarity (Saamanya-Visheshha Siddantha), theory of three entities (Tridosha Siddantha) etc. Dosha, Dhātu and Mala are working in synchronous manner to regulate the homeostasis in the body. Features of healthy individual and causation of disease described in Ayurveda are similar to definition and function of homeostasis respectively. The physiological functioning of components involved in the homeostasis is understood by the description of terms used in derivation of the word Vata like Gati, Gamana, Jnana, Prapti and Utsaha. The internal environment is analogous to Asthaya Dhātu which in balanced states fulfills the nutritional requirements of the body and renders health. Features of Chaya, Dosha Kshaya, Vata Vriddhi and Raktha Kshaya are the examples where body's self-regulation occurs to correct the deviations as in homeostasis.

KEYWORDS : Components of homeostasis, Vata, Feedback mechanisms, Samanya-Visheshha Siddantha, Internal environment

INTRODUCTION

Homeostasis is maintaining a constant internal environment in a narrow range that is compatible with maintaining life. Body fluids forms the internal environment i.e. milieu interieur in terms of volume, composition, ion concentrations, pH and temperature. ^[1] Healthy living depends on the constant maintenance of this internal environment within set limits. If it goes beyond the limits, body exhibits malfunction or dysfunction ^[2] which can manifest disease. The working components of homeostasis are the detector, the integrating center and the effector where detectors recognize and sense the deviation, send the input to integrating center via afferent pathway in the form of nerve impulse or chemical signals, control center receives signals then evaluates the input and generates output commands in the form of nerve impulses or hormones and transmits to effector via efferent pathway and these effectors are the body structures that receive output and produce response which corrects the deviation. ^[3] An immense number of regulatory mechanisms are evolved to maintain homeostasis called the feedback mechanisms. If a factor becomes excessive or deficient, body initiates negative feedback which consists of changes that return the factor towards normal value and if the initiating stimulus causes more of the same it is positive feedback. ^[4] So the working of homeostasis in the body is crucial for overall health and survival. Ayurveda describes many principles for maintaining and promoting health like Saamanya-Visheshha Siddantha (theory of similarity and dissimilarity), Tridosha Siddantha (theory of three entities) etc. Body is comprised of Dosha, Dhātu and Mala. ^[5] Dosha are the entities which are capable of vitiating the Shareera (body). But in normal state this Tridosha viz. Vata, Pitta and Kapha have their respective Karma (functions) in the body due to the virtue of their respective Guna (qualities). Dhātu provides Deha Dharana (structural stability) and Poshana (nutritional requirements) to the body. Mala are the metabolic and digestive wastes accumulated within the body which is eliminated out regularly. When these Dosha, Dhātu and Mala are working in synchronous manner they regulate the homeostasis in the Shareera (body).

Aim and Objectives

To critically appraise and interpret the concept of homeostasis in terms of Ayurveda principles.

Materials and Methods

The concepts of homeostasis were studied from modern physiology textbooks and literature concerned with Ayurveda principles was taken from various classical Ayurvedic compendia like the Brihatrayi. Scientific research articles were also scrutinized from recognized sites and journals. The principles of Ayurveda were used to interpret and understand the concepts of homeostasis through conceptual analysis.

DISCUSSION

Definition of Homeostasis in Ayurveda

Ayurveda declares a person to be healthy when the principal constituents of the body like Dosha, Agni, Dhātu and Mala are in Sama Avastha (stable state) with sound senses and psychological stability. ^[6] It is in likeness to homeostasis which is achieved by the maintenance of stable internal environment to render healthy functioning body.

Function of Homeostasis as Per Ayurveda

Disease or infirmity arises from an imbalance of Dosha whereas health results from their equilibrium ^[7] which is similar to the fact that well operating homeostasis promotes health, while disrupting it causes malfunctioning of body leading to illness.

Understanding Components of Homeostasis in Ayurveda

The components involved in homeostasis viz. detector/sensor, control center and effector function by the influence of Vata Dosha which can be understood by the physiological actions like Gati, Gamana, Jnana, Prapti and Utsaha mentioned in the derivation of the word Vata. Vata is responsible for Gati and Gamana (movement), Jnana (knowledge), Prapti (receiving) and Utsaha (involvement). Physiological importance emphasized in the word Prapti of Vata derivation can be understood as receiving of the sensory stimulus by detector and response by effector, word Gamana can be

understood as impulses from sensor which are transmitted to the control center by afferent pathway and center in turn, sends impulses to the effector by efferent pathway and word Jnana can be understood as perceiving the impulses and generating the appropriate response by the control center.^[8] (Figure 1)

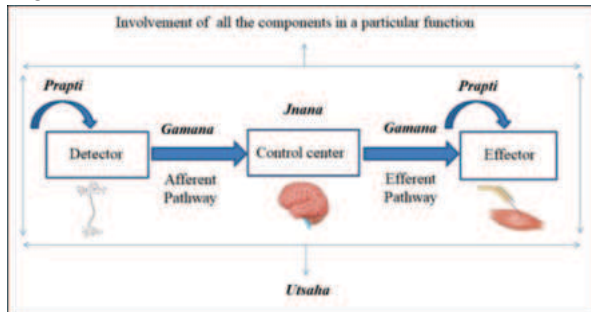


Figure 1- Understanding components of homeostasis in Ayurveda

Understanding Feedback Mechanisms of Homeostasis in Ayurveda-

The Samanya Vishesha Siddhantha (theory of similarity and dissimilarity) where Samanya explain that similarity increases the quality and intensity of a physiological function^[9] analogous to positive feedback mechanism in which the output amplifies the stimulus leading to an increase of the process as in blood coagulation where prothrombin is converted to thrombin and the thrombin once formed initiates the formation more thrombin molecules which activates factor V which further aids in conversion of prothrombin to thrombin.^[10] Vishesha explain that dissimilarity decreases the quality and intensity of a physiological function^[9] analogous to negative feedback mechanism in which the output counteracts the stimulus and maintain the balance by reducing the effects of deviation as in regulation of TSH secretion where increased thyroxine inhibits TSH secretion and decreased thyroxine stimulates TSH secretion.^[11] Pravrutti of Samanya and Vishesha is the cause for increase and decrease of altered Dosha, Dhatu and Mala from their normal levels to bring back their equilibrium state. (Figure 2)

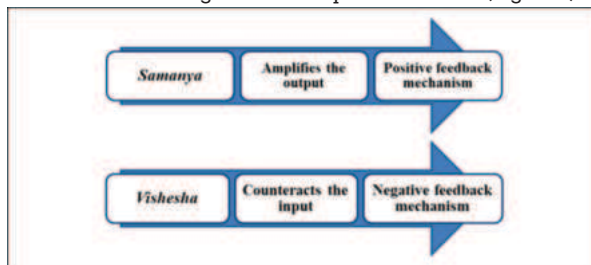


Figure 2- Understanding Feedback Mechanism in Ayurveda

Internal Environment in Ayurveda-

Dhatu in the Shareera exists in two forms called the Sthayi Dhatu (nourishable) and Asthaya Dhatu (nutrient). Asthaya Dhatu constantly keeps circulating in their respective Srotus to give nutritional requirements to the body.^[12] This Asthaya Dhatu in a balanced state results in healthy body which is similar to the internal environment which consist the extra cellular fluids like plasma, blood, nutrients and ions which are in constant motion so that continuous replenishment of nutrients is there.^[13] This stable internal environment leads to homeostasis in the body.

Examples of Homeostasis in Ayurveda-

1. Chaya- The condition in which accumulation of vitiated Dosha takes place in its own site is called Dosha Chaya. In such status, the body tries to oppose its progress by having desire towards the food and activities opposite to the qualities of Dosha which has undergone Chaya.^[14] This is

how body tries to counteract Chaya to bring homeostasis.

2. Dosha Kshaya- The reduction of any Dosha will be recovered by having desire for the food and activities which are able to increase that particular Dosha which is reduced^[15] and thereby equilibrium is established and homeostasis is achieved.
3. Vata Vriddi- Vata Dosha is endowed with Sheetha Guna (cold property). In Vata Vriddhi body initiates craving towards substances with Ushna Guna (hot property)^[16] to counteract the aggravation of Vata Dosha thereby maintaining the homeostasis.
4. Raktha Kshaya- The qualitative and quantitative reduction of Raktha Dhatu manifests as Raktha Kshaya. Craving for sour and cold food articles^[17] will be observed as a feature. As sour citrus fruits help in iron absorption^[18] they aid in qualitative increase of Raktha Dhatu. When Drava Guna (quantity) of Raktha Dhatu is reduced, to combat this condition body expresses desire for Sheetha Dravya (cold food articles) which amplifies Drava Guna and brings quantitative increase of Raktha Dhatu to restore homeostasis.

CONCLUSION

The concept of homeostasis can be interpreted according to the principles of Ayurveda. Features of healthy individual and causation of disease described in Ayurveda are similar to definition and function of homeostasis respectively. The physiological functioning of components involved in the homeostasis is understood by the description of terms used in derivation of the word Vata like Gati, Gamana, Jnana, Prapti and Utsaha. The internal environment is analogous to Asthaya Dhatu which constantly moves throughout the body fulfilling the nutritional requirements. Conditions like Dosha Chaya, Dosha Kshaya, Vata Vriddi and Raktha Kshaya are the examples where body's self-regulation occurs to correct the deviations as in homeostasis.

REFERENCES

1. Jain AK, Textbook of physiology,9th edition. New Delhi: Arya publishing company; 2022.p.4.
2. Sembulingam K, Essentials of medical physiology.6th edition. New Delhi: Jaypee publications; 2012.p.38.
3. Sembulingam K, Essentials of medical physiology. 6th edition. New Delhi: Jaypee publications; 2012.p.39.
4. Guyton Arthur C, Hall John E, Textbook of medical physiology. 11th edition. Beijing; Elsevier Saunders; 2006.p.7, 8.
5. Vaidyajadavji Trikamjiacharya. Sushruta Samhitha of Sushruta with Dalhana's Nibandhasangraha commentary, Sutrasthana 15/3. 7th edition. Varanasi: Chaukhambha Orientalia; 2002.p.67.
6. Vaidyajadavji Trikamjiacharya. Sushruta Samhitha of Sushruta with Dalhana's Nibandhasangraha commentary, Sutrasthana 15/41. 7th edition. Varanasi: Chaukhambha Orientalia; 2002.p.75.
7. Krishna Ramchandra Shastri Navre. Ashtangahridayam of Vagbhata with Arunadatta's Sarvangasundara and Hemadri's Ayurvedarasayana commentary, Sutrasthana 1/20. Reprint edition. Varanasi: Chaukhambha SurabharatiPrakashan; 2018.p.14.
8. Kamath Nagaraj. Critical analysis on physiology of homeostasis mechanism as per Ayurveda. Unique Journal of Pharmacy. 2020 May 8; 09(03):1-3.
9. Vaidya Jadavaji Trikamji acharya. Charaka Samhitha of Agnivesha with Chakrapani Datta's Ayurveda Deepika commentary, Sutrasthana 1/44. Reprint edition. Varanasi: Chaukhambha Sanskrit Sansthan; 2017.p.9.
10. Sembulingam K, Essentials of medical physiology.6th edition. New Delhi: Jaypee publications; 2012.p.130.
11. Sembulingam K, Essentials of medical physiology.6th edition. New Delhi: Jaypee publications; 2012.p.41.
12. Vaidya Jadavaji Trikamji acharya. Charaka Samhitha of Agnivesha with Chakrapani Datta's Ayurveda Deepika commentary, Chikitsasthana 15/16. Reprint edition. Varanasi: Chaukhambha Sanskrit Sansthan; 2017.p.514.
13. Sudha Vinayak Khanorkar, Insights in Physiology. 1st edition. New Delhi: Jaypee publications; 2012.p.6.
14. Krishna Ramchandra Shastri Navre. Ashtangahridayam of Vagbhata with Arunadatta's Sarvangasundara and Hemadri's Ayurvedarasayana commentary, Sutrasthana 12/22. Reprint edition. Varanasi: Chaukhambha SurabharatiPrakashan; 2018.p.195.
15. Vaidyajadavji Trikamjiacharya. Sushruta Samhitha of Sushruta with Dalhana's Nibandhasangraha commentary, Sutrasthana 15/29. 7th edition. Varanasi: Chaukhambha Orientalia; 2002.p.73
16. Krishna Ramchandra Shastri Navre. Ashtangahridayam of Vagbhata with Arunadatta's Sarvangasundara and Hemadri's Ayurvedarasayana commentary, Sutrasthana 11/6. Reprint edition. Varanasi: Chaukhambha SurabharatiPrakashan; 2018.p.183.
17. Krishna Ramchandra Shastri Navre. Ashtangahridayam of Vagbhata with Arunadatta's Sarvangasundara and Hemadri's Ayurvedarasayana commentary, Sutrasthana 11/17. Reprint edition. Varanasi: Chaukhambha

- Surabharati Prakashan; 2018, p.185.
18. Ballot D, Baynes RD, Bothwell TH, Gillooly M, Macfarlane J, Macphail AP et al. The effects of fruit juices and fruits on the absorption of iron from a rice meal. *British Journal of Nutrition*. 1987; 57(3):331-43.