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Dhatu Poshana Nyaya : An Ayurvedic Concept of Metabolic Transformation and Transport of Substances through Cell Membrane.

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ABSTRACT

Ayurveda, a system of medical science based on experience of many centuries of medical practice. Ayurvedic acharyas had acknowledged and documented various information and theories through their insight perception. The basic concepts of Ayurveda need to be explained and proved in terms of modern knowledge. In Ayurveda ahara has the greatest importance among three *upastambhas* i.e. *ahara, nidra and bramhacharya*. The physical as well as mental health depends upon the type of ahara taken and metabolic transformation of ahara and their uptake by different cells, as per classical texts this concept is known as *dhatu-poshana nyaya*. This review enlightens future research and scientific approach of Ayurveda in the context of *Dhatu Poshna Nyaya* (metabolic transformation and movement of substances through cell membrane).

Keywords: *Active Transport; Dhatu Poshana Nyaya; Metabolic Transformation; Passive Transport.*

INTRODUCTION

The basic theory of Ayurveda is to maintain the state of equilibrium of dosha, dhatu and mala. All these three are nourished initially by the influence of potency of individual Jatharagni and productive nutrients (ahara rasa) are passed respectively into each level of dhatu (bodily tissues) for nourishment. Ultimately, necessary nutrients for the formation and development of tissues are supplied by one stream of pool.¹ In ayurveda ahara has greatest importance among three *upastambhas* i.e. *ahara, nidra, bramhacharya*. Acharyas have given different concepts of dhatu poshana like *kshira dadhi nyaya, kedari kulya nyaya, khale kapot nyaya, ek- kal dhatu poshana nyaya* in different part of classical text as per need.

Research has explained the concept of passive transport and Active transport. Passive transport is the transport of substances along concentration gradients or electrochemical gradients or both. It is also known as diffusion or downhill movement. Passive transport is like swimming in the direction of water flow in a river. It

includes simple diffusion and facilitated diffusion. Osmosis is also a special type of passive transport.

Active transport is the movement of substances against the electrochemical gradient. It is like swimming against the water tide in a river. It is also called uphill transport. Active transport requires energy, Active transport is of two types i.e. primary active transport and secondary active transport.²

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METHODS

Search term *Nyaya* was searched for by *Nighantus* from an online portal. And the searched items have been attempted for correlation with modern physiology.

RESULTS

Kshira Dadhi Nyaya (Theory of metabolic transformation):

Kshira (milk) and *dadhi* (curd) are two separate substances. Curd is made from milk by its total transformation. This theory indicates the transformation of the particular tissue into the next tissues. According to this law, as milk converts into curd, in the same manner the *rasa dhatu* converts into *rakta dhatu*. Similarly *mamsa*, *meda*, *asthi*, *majja* and *sukra* are formed by virtue of the progressive stage of transformation and *sukra* is responsible for causing pregnancy (*garbha*).^{3,4} This is also called *karma parinama paksha*.

Different physiological concepts supporting *Kshira Dadhi Nyaya*:

Sequential conversion of different substances supports this *nyaya*. Here *acharyas* have described transformation of one substance into another substance. Different biochemical transformational process like glycolysis pathway (Glucose → 2 molecules of pyruvate.), *kreb's* cycle (Pyruvate + aceto -Co-A → Oxalo acetic acid), gluconeogenesis pathway (Pyruvate and phosphoenolpyruvate → Glucose-6-phosphate then ultimately Glucose), *urea* cycle (alpha amino acids and keto amino acids undergo transamination and oxidative deamination to form *urea*) etc supports this *nyaya*, in all these process one substances transformed into another substance.

***Khale Kapota Nyaya*:**

Khale means place where grains are kept after being brought from the fields (grainary or bran) and *Kapota* means pigeon or represents birds. Just as pigeons come to a heap of grains to pick up their requirements as per their need and go back to their dwelling. In this process *kapotas* use energy to fulfill their requirements. Similarly, *dhatu*s pick up their nutrition from the pool of *rasa dhatu* as per their requirements, the *ahara rasa* contain the nutrient factors for all the *dhatu*s in the body just as pigeons^{3,5,6} (*kapotas*) pick their grains.

Different physiological concepts supporting *Khale Kapota Nyaya*:

In this process *kapotas* use energy to fulfill their requirements. Any process requires energy (active transport) to maintain the homeostasis of our body. eg. primary active transport (sodium potassium pump, calcium pump, Proton Pump) secondary active transport (antiport and symport), selective reabsorption etc.

Kedari Kulya Nyaya

Kedari (*kyari*) means field (paddy field) and *kulya* in this reference denotes a small canal. The technique is used in the process of irrigation where the water from the reservoir is supplied to small fields (*kedari*) through canals. In *kulya* (canals) the movement of water takes place in the direction of gravitational force. The water reaches to the first part of the field (*kedari*) and after that it reaches the second part of the field by pressure gradient process (when first *kedari* filled with water then water moves to the next *kedari*). It explains the passive diffusion of particles across the cell membrane.^{3,5,7}

Different physiological concepts supporting *Kedari Kulya Nyaya*:

This theory means the nourishment of *dhatu*s by the transmission or transportation process. This process probably explains the importance of pressure gradient which determines the flow of fluid into the tissue spaces. It explains the passive diffusion of particles across the cell membrane along the concentration gradient because water in the above example passes into different fields passively along the direction of concentration gradient. This theory may explain different types of passive transport like diffusion, facilitated diffusion, filtration and osmosis.

Eka Kala Dhatu Poshana Nyaya (Theory of simultaneous process) :

Arundutta has described that the *ahara rasa* percolates into all the *dhatu vaha srotas* simultaneously. This theory is known as *eka dhatu poshana paksha*.⁸ The *ahar rasa* circulates in whole body continuously for all times by normal activity of *vyana vayu*.⁹

Different processes support *Eka Kala Dhatu Poshana Nyaya*:

According to *acharya Charak* formation of *dhatu* from *ahara rasa* is a cyclic and continuous process.¹⁰ *Rasa* is circulated all over the body by *vyana vata* and it nourishes all *dhatu*s.⁶ *Ek kala dhatu poshana nyaya* explains that *dahtu* gets nourishment at same time (simultaneously) through different processes like *kshira dadhi nyaya*, *khale kapota nyaya*, *kedari kulya nyaya*.

CONCLUSIONS

Different bio- chemical transformational processes like Glycolysis Pathway, Kreb's cycle etc supports *kshira dhadhi nyaya*. Any process that requires energy (Active Transport) to maintain the homeostasis of our body supports *khale kapot nyaya*. Passive transport like diffusion, facilitated diffusion, filtration and osmosis etc supports *kedari kulya nyaya*. According to *ek-kala dhatu poshan nyaya dhatu's* get nourishment by all three processes i.e. *kshira dhadhi nyaya, khale kapot nyaya, kedari kulya nyaya* at same time. So it can be concluded that the classical concept of *nyaya* is equivalent to different physiological processes described in metabolic transformations of food, hence, the classical principles in the present scenario are still noteworthy.

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