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ABSTRACT

Introduction: Ayurveda, an ancient medical science, encompasses centuries of experience in patient care. The great Ayurvedic Acharyas have meticulously observed, conceptualized, and documented numerous theories and principles. In the modern era, it is essential to reinterpret and validate these foundational concepts through contemporary scientific understanding. Among the *Traya Upastambha*—*Ahara* (diet), *Nidra* (sleep), and *Brahmacharya* (celibacy)—*Ahara* holds the foremost importance. The nature of the food consumed, its metabolic conversion, and cellular assimilation play a pivotal role in maintaining both physical and mental well-being. This process is described in classical Ayurvedic texts as *Dhatu Poshana Nyaya*ⁱ, the principle governing the nourishment and transformation of body tissues. This review aims to elucidate the concept of *Dhatu Poshana Nyaya* in relation to modern physiological mechanisms such as cellular metabolism and material transport across membranes. **Materials and Methods:** The term *Nyaya* was explored through Ayurvedic Nighantus and online databases. The findings were then compared and correlated with modern physiological concepts for a better scientific understanding. **Discussion:** Modern research explains the mechanisms of *active* and *passive* transport in cellular physiology. In passive transport, substances move along concentration or electrochemical gradients, akin to drifting with a river's current, and include processes such as diffusion and osmosis. In contrast, active transport involves the movement of substances against these gradients, comparable to swimming upstream, and requires energy expenditure. This energy-driven process is further classified into *primary* and *secondary* active transportⁱⁱ. **Conclusion:** The nourishment and development of *Dhatu*s (body tissues) is a continuous process that begins in the embryonic stage and continues throughout life. The *Ahararasa*, the vital essence of digested food, serves as the primary source of nutrition for all *Dhatu*s, which are nourished sequentially from *Ahararasa* to *Shukra Dhatu*. The entire dietary intake is first digested by *Jatharagni* in the *Amashaya* (stomach), initiating the process of *Dhatu* formation and sustenance.

KEYWORDS: *Dhatu Poshana*, *Dhatu Poshana Nyaya*, Metabolic Transformation, Nutrients.

INTRODUCTION

Types of *Nyaya*: Only specific forms of *Agni*, particularly *Dhatvagni*, are responsible for refining and maturing the essential nutritional components. After the food (*Ahara Dravya*) is completely digested by *Jatharagni*, it is separated into two parts — *Prasada* (the pure or nutritive portion) and *Kitta Bhaga* (the waste portion). The *Prasada* part provides nourishment to the *Doshas* and *Dhatu*s, supporting their proper function and growth, while the *Kitta* portion, representing metabolic waste, is excreted from the body. In Ayurveda, there are

four principal theories that explain the mechanism by which the various *Dhatu*s of the body receive their nourishment.^[3]

1. *Ksheeradadhi Nyaya* – (Theory of complete Transformation process)
2. *Kedarkulya Nyaya* – (Theory of Transportation process)
3. *Khalekapot Nyaya* – (Theory of Selection process)
4. *Ek kaal dhatuposhan Nyaya* – (Dynamic process)

Kshira Dadhi Nyaya (Law of Transformation)

Also known as *Sarvatma Parinama Paksha* or *Kramaparinama Paksha*, this theory explains that each *Dhatu* (body tissue) successively transforms into the next, similar to how milk gradually turns into curd under the influence of *Agni*. According to this principle, the *Ahara Rasa* (nutrient essence of food) first becomes *Rasa Dhatu*, which then transforms into *Rakta Dhatu*, and this process continues until the formation of *Shukra Dhatu*,^[4] the final tissue.

Some classical sources state that it takes six days for *Shukra Dhatu* to form from *Rasa Dhatu*,^[5] while others propose 24 hours^[6] or even 30 days.^[7] The duration depends primarily on the strength and efficiency of *Agni*.^[8] Certain *Acharyas* have questioned this theory, arguing that if food intake ceases for a month, *Shukra Kshaya* (depletion of semen) occurs because continuous transformation of one *Dhatu* into another would leave no *Rasa* remaining. To clarify this, *Acharya Dalhana* described three modes of *Dhatu Parinama*:

- **Sukshma Bhaga:** Responsible for the formation of *Upadhatu* (secondary tissue) and *Uttarottara Dhatu* (next tissue).
- **Mala Bhaga:** Leads to the production of metabolic waste.
- **Sthula Bhaga:** Maintains and nourishes the same *Dhatu* itself.

Thus, in *Kramaparinama*, each *Dhatu* partially transforms—one part sustains its own function while the other part acts as the precursor for the next *Dhatu* and its byproducts, which are referred to as *Mala*.^[9]

Physiological Correlation

Through the action of *Dhatvagni*, each *Dhatu* undergoes transformation, serving as the precursor for the next tissue. This process resembles *tissue de novo synthesis* or *cellular transformation* in modern physiology, where nutritive substances are converted into new tissues. Examples include the development of fetal tissues and the differentiation of stem cells in the bone marrow into spermatogonial cells. Such sequential conversion parallels the *Kramaparinama Nyaya* described by the *Acharyas*.

Modern biochemical processes also support this concept — for instance, the transformation of glucose into pyruvate in glycolysis, the Krebs cycle (pyruvate → acetyl-CoA → oxaloacetic acid), gluconeogenesis (pyruvate → phosphoenolpyruvate → glucose-6-phosphate → glucose), and the urea cycle (amino acid transamination and deamination). These sequential metabolic reactions exemplify the same principle of stepwise transformation.

Khale Kapota Nyaya (Law of Selectivity)

The term *Kapot* refers to pigeons, while *Khale* denotes the area where grains are collected and stored after

harvest. Just as pigeons fly long distances to gather grains from a single heap, take what they need, and return to their nests, each *Dhatu* extracts the required nutrients from the *Rasa*. Similar to pigeons that travel from different directions and distances to reach the grain mound and return at various times depending on their journey, the *Ahara Rasa* contains nutrients essential for nourishing all *Dhatu*s in the body. This *Nyaya* illustrates how each *Dhatvagni* selects what it needs from the same *Anna Rasa*, which holds the nutrients of all *Dhatu*s. The length of each *Srotas* also differs according to the distance of its respective *Dhatu Ashaya*. When the *Ashaya* is near, the *Srotas* are shorter; when it is farther away, the *Srotas* are longer, causing the *Rasa* to travel a greater distance to reach that *Ashaya*. Hence, all *Dhatu Poshana* takes place directly from *Rasa Dhatu*, and no *Dhatu* is nourished by the *Poshaka Ansha* of the preceding *Dhatu*.^[10]

Different Physiological Concepts Supporting Khale Kapota Nyaya

In modern physiology, *Khale Kapota Nyaya* can be understood as blood tissue selectively absorbs nutrients like iron and vitamins, while bone tissue primarily takes in amino acids and minerals such as calcium carbonate and phosphorus. Each protein molecule binds in specific combinations, ensuring that nutrients are delivered precisely where needed. Within the cell, a similar process occurs when a vesicle fuses with the outer membrane to release its contents. The plasma membrane's property of selective permeability allows only certain substances to pass through. When *Ahararasa* reaches a particular tissue or *Dhatu*, only the relevant particles are permitted to enter, aiding in the formation of that *Dhatu*. This specificity is due to the presence of enzymes, channels, and receptors unique to each cell. Each enzyme or receptor interacts only with specific substrate molecules, allowing selective transmission of materials according to the structure and function of the cell.^[11]

In the same way, pigeons expend energy to fulfill their needs. Energy, or active transport, is essential in maintaining the body's internal balance (*homeostasis*). Examples include selective reabsorption, secondary active transport (antiport and symport), and primary active transport mechanisms such as the sodium-potassium pump, calcium pump, and proton pump.^[12]

Kedari Kulya Nyaya (Law of Transmission)

This theory compares the distribution of nutrients to the flow of water through irrigation channels (*Kulya*) that distribute water from a central source (*Kedara*) to various plots of land. Similarly, *Ahara Rasa* flows through the body's channels (*Srotas*), sequentially nourishing each *Dhatu*—first *Rasa*, then *Rakta*, and so on.^[13] *Sushruta* uses this analogy to describe the *Siras* (vessels) that transport nourishment throughout the body. In fetal life, nutrition reaches the embryo through the *Nadi* connecting the umbilicus to the mother's heart.^[14]

Physiological Correlation

This *Nyaya* aligns with the principles of circulation and nutrient distribution in modern physiology. The *Ahara Rasa* travels through the circulatory system, reaching each tissue compartment via pressure gradients—comparable to the passive flow of water under gravity. It also relates to *passive diffusion* across cell membranes, where substances like oxygen and carbon dioxide move along concentration gradients without energy expenditure. Thus, *Kedari Kulya Nyaya* beautifully explains passive nutrient distribution and the role of hydrostatic and osmotic pressure in tissue perfusion.^[15]

According to this concept, *Dhatu* are nourished through the process of transmission or conveyance. This principle highlights the importance of the pressure gradient, which regulates the movement of fluids into tissue spaces. Just as water passively flows into different fields along a concentration gradient, this process illustrates how particles diffuse across cell membranes following the same gradient. Hence, it provides an understanding of various passive transport mechanisms, including osmosis, facilitated diffusion, filtration, and simple diffusion.^[16]

Eka Kala Dhatu Poshana Nyaya (Theory of Simultaneous Process)

This view was proposed by *Arunadatta*, the commentator of *Ashtanga Hridaya*. According to this theory, once *Ahara Dravya* is properly digested with the help of *Jatharagni*, the resultant *Ahara Rasa* enters all *Dhatu Vaha Srotas* simultaneously and nourishes all *Dhatu* at the same time without any time gap. *Acharya Charaka* explains that after complete digestion, *Ahara Rasa* blends with the body's plasma and, through the contraction and relaxation of the heart governed by *Vyana Vayu*, is circulated to nourish all tissues. Similarly, *Acharya Sushruta* states that *Ahara Rasa* constantly nourishes all *Dhatu* throughout life with the help of *Vyana Vayu*. This view highlights the heart's vital role in circulating the digested nutrients through the blood, ensuring that with every systolic action, nourishment reaches all tissues simultaneously.

Different Physiological Concepts of *Eka Kala Dhatu Poshana Nyaya*

Acharya Charaka describes the process of *Dhatu* formation from *Ahara Rasa* as continuous and cyclical. *Rasa Dhatu* nourishes all other *Dhatu* and is distributed throughout the body by *Vyana Vata*. According to *Eka Kala Dhatu Poshana Nyaya*, all *Dhatu* receive nourishment simultaneously through combined mechanisms similar to *Kshira Dadhi Nyaya*, *Khale Kapota Nyaya*, and *Kedari Kulya Nyaya*.

DISCUSSION

The Ayurvedic concept of *Saptadhatu* explains the body's essential structural and nutritional framework. In living organisms, *Dhatu* are constantly formed, destroyed, and regenerated to maintain dynamic metabolic balance. This continuous process of *Dhatu*

development and nourishment begins from the embryonic stage and continues throughout life. The term *Dhatu Poshana Nyaya* refers to various theories that explain how *Dhatu* are nourished.

According to *Kshira Dadhi Nyaya*, the entire *Rasa Dhatu* transforms into *Rakta Dhatu*, the entire *Rakta* into *Mamsa*, and so on, up to *Shukra Dhatu*. However, this theory cannot fully explain all physiological phenomena. For example, if *Meda Dhatu* increases, it does not necessarily result in an increase in *Asthi Dhatu*. In modern physiology, *Kshira Dadhi Nyaya* corresponds to tissue transformation or de novo synthesis. Since certain *Rasayana*, *Vajikarana*, and *Vishahara Dravya* act specifically on particular tissues, this theory alone does not explain selective tissue nourishment.

Kedari Kulya Nyaya likens the distribution of nutrients to water flowing through irrigation canals to different fields, showing how nutrients reach various *Dhatu*. However, *Meda Vriddhi* does not always lead to *Asthi Vriddhi*. *Khale Kapota Nyaya* emphasizes selective nourishment—each *Dhatu* absorbs only what it requires, indicating that vitiation of one *Dhatu* does not necessarily affect the others. Meanwhile, *Eka Kala Dhatu Poshana Nyaya* suggests that *Ahara Rasa* percolates uniformly into all *Dhatu Vaha Srotas*, nourishing every *Dhatu* simultaneously.

From the above discussion, it is evident that *Rasa Dhatu* plays a crucial role in sustaining all *Dhatu*. Ancient Ayurvedic texts describe *Saptadhatu* formation as a progressive process, beginning from *Rasa Dhatu* and ending with *Shukra Dhatu*. Since all *Dhatu Poshana Nyaya* function as interconnected theories, they cannot be understood in isolation. Each theory complements the others—according to *Kedari Kulya Nyaya*, *Ahara Rasa* flows through specific channels; *Khale Kapota Nyaya* explains selective absorption according to tissue needs; and *Kshira Dadhi Nyaya* describes the transformation of nutrients into *Dhatu Poshaka Amsha*. Among these, *Eka Kala Dhatu Poshana Nyaya* is universally accepted as the most comprehensive view.

CONCLUSION

Kshira Dadhi Nyaya finds its parallel in various biochemical transformation pathways such as glycolysis and the Krebs cycle. *Khale Kapota Nyaya* corresponds to energy-dependent processes, like active transport, which maintain homeostasis in the body. *Kedari Kulya Nyaya* relates to passive transport mechanisms including osmosis, facilitated diffusion, filtration, and simple diffusion. According to *Eka Kala Dhatu Poshana Nyaya*, all *Dhatu* receive nourishment simultaneously through these three mechanisms—*Kshira Dadhi Nyaya*, *Khale Kapota Nyaya*, and *Kedari Kulya Nyaya*. Thus, the classical Ayurvedic theories correspond closely with modern physiological processes involved in nutrient metabolism and remain relevant even in the contemporary scientific context.

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