Review Article

Exploring Nutrient Metabolism in Ayurveda: Uncovering Ancient Insights

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Abstract

Ayurveda, the ancient Indian system of medicine, provides a unique framework for understanding nutrient metabolism. It conceptualizes metabolism through a holistic integration of digestive fire (Agni), bodily humors (doshas), and tissue transformation (dhatus). This article examines Ayurvedic principles of nutrient assimilation and metabolism in the context of both classical texts and contemporary biomedical understanding. The relevance of Ayurvedic models is discussed concerning modern metabolic health, with particular focus on gut health, immune resilience, and personalized nutrition.

Studies have found that persistent disturbance of nutrient metabolism and/or Dosha homeostasis, caused by either nutrient deficiency or excess, induces imbalance in mahabhoota (cellular stress) leading to Agnimamdya (metabolic dysregulation) and Dhatudushti (tissue damage), and eventually to the development of Agnimamdya-related Vyadhi (acquired metabolic syndromes.)

Keywords: Ayurveda, metabolism, Agni, doshas, dhatus, digestion, nutrient assimilation, integrative health

Introduction

Overall, there is an increase in the number of cases of acquired metabolic disorders over the years, such as diabetes mellitus type 2, obesity, fatty liver diseases, and cardiovascular diseases.[(1)]

Ayurveda, one of the world's oldest healing systems, takes a comprehensive approach to health by focusing on balance and holistic wellness.[(2)] At the core of its physiological understanding is the concept of nutrient metabolism, which encompasses digestion, absorption, tissue transformation, and waste elimination. Unlike modern biochemistry, which emphasizes isolated processes, Ayurveda interprets metabolism through the dynamic interaction of the three doshas -Vata, Pitta, and Kapha - and the functional energy known as Agni.[(3)]

Nutrients have many roles, including nutrition. A better understanding of metabolism and the active role of nutrients assists in the analysis of physiological processes such as *agnideepan*, *dhatuposhana*, and *urja pradanam*.

Nutrients In Ayurveda

Rasa (Taste) is an important nutrient in food. Six types of rasa have different roles in the metabolism process. [(4)]

Rasa	Role in metabolism	Function of rasa
Madhura	Energy provider	Balya, Brimhana, Sandhana , preenan
Amla	Energy provider , Agni Deepan	Agneedeepan, pachana, rochana ,kledan, preenan
Lavana	Hydration	Agnikruta, snehana, rochana
Katu	Enzyme , bile regulation	Snehashoshan, meda shoshana, kledashoshana, anna shoshana,agni Deepana , pachana
Tikta	kledashoshana	Visha shoshana, kleda shoshana , meda shoshan, vasa shoshan
Kashaya	kledashoshan	Kleda shoshana, medashoshana ,grahee

Every rasa has 3 levels of metabolism

1.Jatharagni level

2. Dhatwagni level

3. Bhutagni level

Dhatwagni Level Madhura Rasa Metabolism

Component / Metabolite

Guru – Brimhana

Snigdha -Balya , Preenana, Sandhana

Nourishes ALL dhatu plus oja

Bhutagni Level

Metabolite – *Prithvi mahabhoot +Jala mahabhuta*

Prithvi – mamsa, meda, asthi

Jala – rasa, rakta, majja and shukra

When a person consumes excess Madhura rasa it stresses both *dhatwagni* and *jatharagni* which leads to excess production of *asara dhatu* (qualitatively less functional dhatu) and *mala*(waste products)

कुस्तेऽप्युपयोगेन स मेदः श्लेष्मजान् गदान् ।
स्थौल्याग्निसादसन्न्यासमेहगण्डार्बुदादिकान् ।।

DHATWAGNI STRESS – MEDA VRUDDHI, GANDA, ARBUDA ,AGNISADA
BHUTAGNI STRESS – STHOULYA ,SAAD, SANYASA, MEHA

Atiyoga Symptoms (Overnourishment)

Rasa	Mahabhoota Constitution	Meatabolites/ Guna	Dhatwagni Level Metabolism	Bhutagni Level Metabolism	Dhatwagni Level Symptoms	Bhutagni Level Symtoms
MADHURA	Prithvi + Jala	Snigdha, Guru, sheet	All dhatu + ojas	Prithvi	Kantha mamsa abhivruddhi Shwas kas pratishyay sheet jwara Shopha Dhamani upalepa Kaphaj vikara	Sthoulya Agnimandya Sangya pranash Galaganda Gandamalashleepad
AMLA	Prithvi + Teja	Snigdha, ushna guru	Rasa, rakta, mamsa, meda	Jala	Rakta dushti, mamsa vidaha,shotha	Paak
LAVANA	Jala + Agni	Snigdha, ushna guru	Rasa rakta	Jala	Mamsakotha Kushtha galan ShophaValita Khalita Napusankata	Murcha VishaVardhan Dantachalan Indriya dourbalya
KATU	Vayu + Agni	Laghu, rooksha, ushna	-	Agni	Napusankata Karshya Vataj vikara	moha
TIKTA	Vayu + aakash	Laghu, rooksha, ushna	-	Akasha	Shoshan Kharatwa Bhrama Karshya Balanash Vataj vikara	Moha
KASHAYA	Vayu + Prithvi	Laghu, rooksha, ushna	Gate keeper	Vayu	Aasya shosha Hrutpida Shyavata Karshya	Napusankata Pakshavadha Apatanak ArditaVata vikar

Vipaka

Vipaka is secondary nutrient after rasa. It is the specific, post-digestive effect of a substance, also known as the final transformation or bio-transformation of digested food. Here are two types of metabolism in food. Food go through these two transformation.[5]

Avasthapak	Nishthapak
Temporary transformation	End product
Creates malaroopa dosha – diseases causing Three transformation Aamashaya – Madhura Pachyamanashaya – amla Pakwashaya – katu	Create dhaturoop dosha – nourishing dosha
Momentary effect and confined to region	Effect can seen on whole body and for long period

Nishtapak / vipaka nourishes dosha primarily and have impact on excretory function.

No	Vipaka	Guna	Effect on dosha	Effect on dhatu	Effect on mala (vata, purisha, mutra)
1	Madhura	Snigdha guru	Nourishes kapha	shukrakar	Sukhakar pravrutti
2	Amla	Snigdha laghu	Nourishes pitta	Shukranasha	Sukhakar pravrutti
3	Katu	Ruksha	Nourishes vata	Shukra naash	Vibandha

The Ayurvedic Framework of Metabolism

Agni , quantity ,quality , season, eating timings and eating habits have great impact on metabolism.

The Role of Agni

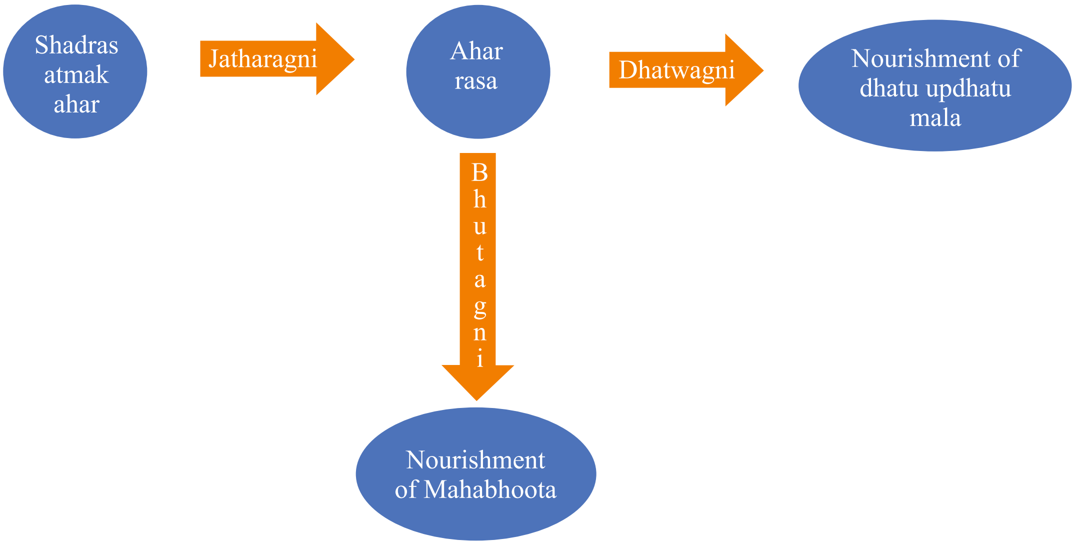
In Ayurveda, Agni refers not just to digestive enzymes or gastric fire, but to the transformative energy responsible for all metabolic functions.[6] Ahara Dravya is divided into two forms, such as Prasada (Sara) and Kitta Bhaga, after being properly digested by a Jatharagni.[7,8] The Prasada portion (nutrients) nourish the Dosha and Dhatus. Metabolic waste, or kitta component, must be eliminated from the body. Agni is classified into:

Jatharagni: Central digestive fire in the stomach and small intestine.

Bhutagni: Elemental digestive fires, each governing the metabolism of the five elements (Pancha Mahabhutas).

Dhatvagni: Seven tissue-level agnis, responsible for the transformation of nutrients into bodily tissues (dhatus).

Optimal Agni leads to proper digestion and assimilation of nutrients, whereas impaired Agni leads to the formation of Ama (undigested residues/toxins), which is the root cause of many diseases.[9,10,11]



Nutrient transport system-

Ahar rasa is transported through channels called Strotas

Dhatu Nutrition-

There are prime four theories of nutrition called as Dhatu Poshan Nyaya's described

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)

These four Nyayas (logical analogies) are classical Ayurvedic concepts used to explain how the body nourishes its tissues (Dhatus) through food and metabolic processes. Each Nyaya represents a metaphorical principle to describe different aspects of digestion, absorption, transformation, and nourishment. Here's a concise description of each:

1. Ksheeradadhi Nyaya – Theory of Complete Transformation Process "Ksheera" means milk; "dadhi" means curd. This Nyaya describes how one substance transforms completely into another, just like milk becoming curd, then butter, ghee, etc. It symbolizes the sequential transformation of nutrients from one Dhatu to the next (Rasa → Rakta → Mamsa → etc.).Just as milk gradually transforms into curd, butter, and ghee - each step is dependent on the previous-similarly, the body tissues are nourished sequentially. Each Dhatu is formed only after the complete transformation of the previous Dhatu. It underlines the sequential and dependent nature of Dhatu formation.

2. Kedarkulya Nyaya - Theory of Transportation Process "Kedar" means field; "Kulya" means canal.

Just as water flows through small channels (kulyas) to irrigate multiple fields (kedars), nutrients are distributed via Srotas (channels) to various tissues.This Nyaya shows how nutrients are transported throughout the body and reach the required Dhatus. Emphasizes the distribution and availability of nutrition to different parts of the body depending on need and demand.

3. Khalekapot Nyaya – Theory of Selection Process "Khale" means grain storage or threshing floor; "Kapota" means pigeon.

Like pigeons selectively pick up grains from a heap, tissues (Dhatus) selectively absorb nutrients according to their needs.Not all nutrients are absorbed equally by all Dhatus. Each tissue has a selective affinity for specific components.Explains selective assimilation - even though all tissues are exposed to the same circulating nutrients, each takes in what it requires.

4. Eka Kaal Dhatu Poshan Nyaya - Dynamic Process (Simultaneous Nourishment) "Eka Kaal" means at one time; "Dhatu Poshan" refers to nourishment of tissues.Contrary to the sequential model (Ksheeradadhi), this Nyaya suggests simultaneous nourishment of all Dhatus at the same time. Like sunlight illuminating all objects at once or rain falling on many fields together, nutrients can reach and nourish multiple Dhatus simultaneously.Highlights the body's dynamic and adaptable capability to nourish all tissues simultaneously when conditions (like metabolic strength and nutrient availability) allow.

Ayurveda's focus on digestion as the cornerstone of health reflects the emerging field of gut-brain axis research.

The gut microbiota is now recognized for its role in mental health, immunity, and systemic inflammation, echoing Ayurveda's assertion that poor digestion leads to both physical and mental ailments. According to ayurveda most problem lies at the level of agni. Malabsorption is more common than malnutrition. Hence Agni Deepan is needed in most cases.

Conclusion

Ayurveda provides a time-tested framework for understanding and optimizing nutrient metabolism through its concepts of Agni, doshas, and dhatus. This holistic approach not only offers insights into digestive health but also proposes preventive and therapeutic strategies that are increasingly relevant in the context of chronic metabolic disorders today. Integrating Ayurvedic principles with modern nutritional science could pave the way for a more comprehensive, personalized approach to health and wellness. The growing convergence of Ayurveda and modern biomedical research affirms that many traditional concepts of digestion and nutrient metabolism are not only metaphorically aligned but also biochemically relevant. Integrating Ayurvedic diagnostics and therapies with scientific tools could open new avenues in functional nutrition, preventive medicine, and systems biology.

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