Review Article

Indian Journal of Ancient Medicine and Yoga
Volume 7 Number 4, October - December 2014

Concept of *Dhatwagni* and its Clinical Manifestation: A Review

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Abstract

Agni (fire) is the invariable agent in the process of *Paka* (chemical action).Ingested food is to be digested, absorbed and assimilated, which is unavoidable for the maintenance of life and is performed by *Agni*. The different types of *Agni* perform different functions according to its site. Wholesome food stuffs ingested in fourfold manner having been digested by *Jatharagni* is followed by further *Paka* by *Bhautikagni* which are again subjected further *Paka* by *Dhatwagni*. *Dhatwagnis* catalyse further metabolic transformation of the nutrient substances before they made available to the seven *Dhatus*. According to modern science, hormones and enzymes also act as catalyst in metabolic transformation similar to that of *Dhatwagni* in *Ayurveda*. This concept is helpful in understanding *Samprapti* (pathogenesis) of metabolic diseases like *Prameha* (diabetes), hypothyroidism and hence in planning line of treatment according to *Ayurveda*.

Keywords: *Agni; Dhatu; Dhatwagni; Margaga Dhatu; Sthanastha Dhatu*.

Introduction

According to *Ayurveda,* Basic constituents of body are *Tridoshas* (three-fold functional forcesor factors), *Saptdhatus* (seven species of elementary tissues of the body) *and Trimalas* (three types of waste products). In their equilibrium states, they are known as *Deha Dhatu* (body tissues). *Dhatu Samya* (equilibrium state of *Dhatu*) is attended with the help of *Dhatu Poshana* (nourishment of *Dhatu*) which depends on *Agni*.*Agni* does not only mean fire but also comprehends various factors which participate and regulate the course of digestion and metabolism or any transformation in the tissue of organism.[1]

Agni is innumerable as it present in every *Paramanu* (cell) of body. According to functions and site of action, *Agni* has been divided into 13 types, i.e. one *Jatharagni*, five *Bhutagni* and seven *Dhatwagni*.[2] *Jatharagni*digests four types of food and results in the breakdown of complex substances into their elemental forms which are still *Vijatiya* (foreign) in nature. *Bhutagni* convert them into *Sajatiya* (organism specific) substances which compose the seven *Dhatus*. *Dhatwagnis* catalyse further metabolic transformation of the nutrient substances before they made available to the seven *Dhatus*. *Dhatwagnis* leads to formation of *Kitta* (metabolic waste) part and *Prasada* (nutrients) part which nourishes *Dhatu* results in *Dhatu Samya*.

According to modern science, hormones and enzymes also act as catalyst in metabolic transformation similar to that of *Dhatwagnis* in *Ayurveda*. This concept is helpful in understanding *Samprapti* of metabolic diseases like *Prameha*, hypothyroidism and hence in planning line of treatment according to *Ayurveda*.

Aim and Objectives

1. To study the concept of *Dhatwagni* for understanding *Samprapti* and deciding

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Table 1: Types of *Agni*

Main type	Functions	No. and names of sub types
Jatharagni/ Udaragni	Looks after the functions of food digestion and absorption.	*1-Jatharagni/ Udaragni*
Bhautikagni	Turns all the *Vijatiya Panchabhautic Dravyas* consumed to *Sajatiya Panchabhautic Dravyas* i.e. conversion of heterogeneous to homogenous.	*5 [Prithwi,Ap,Teja,Vayu,Akash]*
Dhatwagni	Acts for the purpose of synthesis and breakdown of tissue.	*7 [Rasa, Rakta, Mamsa, Medo, Asthi, Majja, Shukra]*

the lineof treatment.

2. To study the *Dhatwagni Paka* or *Dhatwagni Vyapar* (Intermediary metabolism).
3. To study the *Dhatu Poshana Nyaya* (hypotheses regarding the pattern of distribution of nutrients to body tissues).
4. To compare *Dhatwagni* with hormones and enzymes.

Material and Method

Only textual materials have been used for this study, from which various references have been collected. Main *Ayurvedic* texts used in this study are *Charak Samhita, Sushrut Samhita, Ashtang Sangraha, Ashtang Hridaya* and available commentaries on these classics. Modern texts and related *Ayurvedic* texts, websites, articles have also been searched.

Review and Discussion

Concept of Agni:

In *Vachaspatyam, Agni* is defined as *"nayate parinamayateeti"*. The term *"Agni"*, in vogue means fire, however in the concept of functioning of a living organism, *Agni* maintains organism's integrity and vitality by converting the food consumed in various ways, into various structural and functional components and also to provide the energy *(Urjaha),* necessary for proceeding with its innumerable vital activities through the *Pakadi Karmas* (chemical action) i.e. Biophysical and biochemical processes.

Ayurveda has described an important factor of digestion and metabolism in our body as *Agni*. Therefore *Ayurveda* considers that *Dehagni* is the cause of life, complexion, strength, health, nourishment, lustre, *Oja* (~immunity), *Teja* (energy), and *Prana* (life).[3] According to *Charakacharya*, after stoppage of the function of *Agni*, the individual dies, and when the *Agni* of an individual is *Sama* (normal state), then that person would be absolutely healthy and would lead along, happy, healthy life. But, if *Agni* of a person is vitiated, the whole metabolism in his body would be disturbed, resulting in ill health and disease. Hence *Agni* is said to be the *Mool* (base) of life.[4]

Different examples are available in our classics to indicate that *Pitta* is the same as *Agni*. But, some doubts arise behind the concept of whether *Pitta* is *Agni*. The quotation of *Sushruta*, *SamadoshahSamagnishcha[5]* has clearly indicates that *Pitta* and *Agni* are not the same.

Power or state of *Agni* determines the quantity of food to be consumed[6]. Factors responsible for conversion (i.e. digestion and metabolism) of ingested food into appropriate *Dhatu* or tissues are grouped under term *"Agni"*.

Types of *Agni*: According to *Arunadatta,* there are 13 types of *Agni* in the body.[2]

[Refer to table 1]

[Refer to table 2]

When *Agni* fails to perform its optimum function, its sub normality leads to *Agnimandya*(Reduction in normal state of the

Agni) at different level. This will lead to production of *Ama* (indigested food) at that level. *Dalhana* describe that *Ama* can form even at *Dhatu* level due to *DhatwagniMandya* (reduction in *Dhatwagni*).[8] This will leads to ill health and diseases.

Concept of *Dhatu*

The term *Dhatu* is derived from the Sanskrit root *Du Dhatru* which means *Dharana* (to support) and *Poshana* (to nourish).[9] *Dhatus* contributes to make structural architecture of the body. They are seven in number. They are constantly formed, destroyed and reformed with appropriate materials derived from *Poshaka Dravyas* (nutrient substances) from the time of conception to that of death maintaining state of metabolic equilibrium. This process is known as *Dhatwagni Paka*. *Dhatus* are of two kinds namely *Sthayi* or *Poshya* and *Asthayi* or *Poshaka*, corresponding to the seven, already existing, formed and stable *Dhatus* and, an equal number of metabolically produced precursor nutrient substances, which are meant to be utilised for nourishment, synthesis and maintenance of *Poshya* or *Sthayi Dhatus*, respectively.[10]

Sthanastha Dhatu and Margaga Dhatu: *Dhatus* which are *f*ound in their respective *Aashayas* (place where they are present) are known as *Sthanastha Dhatu* and *Dhatu* which are flowing through *Dhamanis* (arteries) known as *Margaga Dhatu*.[11]

Concept of *Dhatwagni*

According to *Vagbhatacharya*, *Kayagni (Jatharagni) Ansha* (portion) located at specific *Dhatu* known as *Dhatwagni* of that *Dhatu*.[12] These *Dhatwagnis* are located in its own tissues according to its own *Srotas* (internal transport system of nutrition)[13], either to form new tissue (anabolic) or to deliver its functions (catabolic). Hence if *Dhatwagni* gets more (*Vruddhi*), tissue delivers more action and thereby more catabolic activity *(Dhatu Kshaya)* or if *Dhatwagni* is of low profile, only tissue synthesis takes place resulting in *Dhatu Vruddhi* (increase in tissue).[14,15] According to *Charaka*, the nutrients that supports the body are subjected to *Paka* again, being acted upon by the seven *Dhatwagnis*, leading to the formation of two products i.e. *Kitta* and *Prasada[16]*.It means *Dhatwagni* acts as a catalyst for metabolic transformation.

Jatharagni,Samana Vayu, Vyana Vayu, Prana Vayu, *Indhan* (fuel) are the factors affecting *Dhatwagni*. In presence of *Indhan, Dhatwagni* functions proper. For *Dhatwagni*, *Indhan* is *Dhatwahara* (nutrients of the tissues).[17] There are seven kinds of *Dhatwagni* corresponding to seven species of *Dhatu*.

Dhatwagni Paka or *Dhatwagni Vyapar*

The term *Paka* has been defined by *Medini* (on *Amarakosha*), as that which causes *Parinamana* (transformation) and *Paravritti* (mutation).[18] These are the chemical reactions caused by *Dhatwagni*. *Dhatwagni Paka* corresponds to intermediate metabolism. *Dhatwagni* acts upon appropriate *Dhatu PoshakaAnsha* (nutrient substances) present in a potential form in *Aahara Rasa* (food after intestinal digestion) and produced *Asthayi Dhatu* or *Poshaka Dhatu* which built up *Sthayi or Poshya Dhatu* later in particular *Srotas.*

The seven verities of *Dhatu* support and sustain the life of the body and these undergo metabolic transformation in two different ways i.e. *Kitta* and*Prasada*.*Prasada Paka* is stated to yield the seven kinds of *Poshaka/ AsthayiDhatus, Upadhatus* (supplementary tissues)andlatter, *Kittas* i.e. respective *Dhatu Malas.*

Dhatu Poshana Nyaya[19]

There are three well known hypotheses as *Kshira Dadhi Nyaya, Kedari-Kulya Nyaya* and *Khale Kapota Nyaya*. In *Kshira Dadhi Nyaya*, pattern of distribution of nutrients analogous to that of souring of milk in which the entire milk substrate is transformed into curd. Pressing this analogy, it has been pointed out that the entire *Rasa* substrate is transformed into *Rakta*; the *Rakta*, in its turn, is similarly metamorphosed into *Mamsa* and likewise up to *Shukra.*

In *Kedari-Kulya Nyaya*, pattern of distribution of nutrients is analogous to distribution of water to plots in paddy fields. This analogy refers to the system of distribution of water from a river, lake or well to plots in paddy fields, through a main canal which branches and re-branches to supply water to the nearest as to the farthest plots under cultivation. Similarly, *Rasa Dhatu* is the vehicle that transports nutrients through circulatory channels to the respective *Sthayi Dhatus* which comes in its path.

The *Khale Kapota Nyaya,* the term *Khale* and *Kapota* refer to an accumulation of different kinds of Corns and pigeons respectively. In this analogy, pigeons stand for *Sthayi Dhatu* and *Khale* for *Aahara Rasa*. As the pigeons fly from different places-far and near-to the heap of corns, pick up the kind of corns they require and fly back to their respective places following different routes, the seven species of *Sthayi Dhatus*, situated in the different parts of the body, are started to select and pick up the kind of nutrients they need from the nutrient pool represented by the *Aahara Rasa.*

Clinical Manifestation of Dhatwagni

The nutrient substances which nourish the *Dhatus* undergo *Paka* by the *Agni* of that *Dhatu* known as *Dhatwagni* of that particular *Dhatu*.*Dhatwagni*s are seven in number[20], corresponding to seven *Dhatus*. *Dhatwagnis* mediate or catalyse further metabolic transformation of the nutrient substances, similarly hormones and enzymes trigger the metabolic transformation in modern science.

Hormones are chemical messengers and enzymes are biological catalysts. Both help in metabolism. So *Dhatwagnis*can be compared with hormones and enzymes as the functions of both are same. Ultimate goal is nourishment of "*Deha Dhatu*" (i.e. *Dosha, Dhatu and Mala*) which can be said as metabolic equilibrium.

Rasagni: The function of *Rasa Dhatu* is *Preenana* (Nutrition). *Rasa Dhatu* mainly forms by *Madhur Rasatmak* (sweet) *Dravyas* in the form of carbohydrates and fatty acids. These *Madhur Dravyas* are mainly used as source of energy. Similarly blood Sugar acts as main source of energy which gives nutrition to the body. Soit can be said as *Asthayi Rasa Dhatu.* BSL is maintained with help of Insulin, thyroxine,glucagon (Pancreatic and thyroid hormones) which can be said as *Rasagni*.

Raktagni: Function of *Rakta Dhatu* is *Jivanam* (enlivening). As function of *Rakta Dhatu* and haemoglobin (Hb) is same, Hb is known as *Margaga Rakta Dhatu* and Erythrocytes are known as *Sthanastha Rakta Dhatu*. Level of Hb is maintained with the help of Erythropoietin, thyroxine, interleukin 3 (Secretions of kidney and thyroid)[21] so it can be said as *Raktagni.*

Mamsagni: Function of *Mamsa Dhatu* is *Lepanam* (Construction). *Kapha* mainly involves in construction of body same as that of proteins. Both are *Parthiva* and *Aapya* in nature. So these proteins are known as *Margaga Mamsa Dhatu*. Pepsin, trypsin, chymotrypsin, collagen, carboxypeptidases [Pancreatic enzymes] regulates proteins[21] so can be said as *Mamsagni.*

Medogni: Function of *Meda Dhatu*is *Snehana* (oleation) similar to that of lipids. So lipids can be said as *Margaga Meda Dhatu*. Level of lipids is maintained with the help of Glucocorticoid (of Adrenal cortex), Lipolytic enzymes (of pancreas) such as lipase, Cholesterol ester hydrolase.[21] So it can be said as *Medogni.*

Asthyagni: Function of *Asthi Dhatu* is *Dharana* (bearing/supporting) similar to bones and cartilages. These are made up of Calcium and phosphorus. So Calcium and phosphorus are known as *Margaga Asthi Dhatu*. Level of those is maintained with the help of Parath-hormone (of parathyroid gland), Calcitonin (of thyroid gland) and 1-25 dihydroxy cholecalciferol.[21] These can be said as *Asthyagni*.

Majjagni: Function of *Majja Dhatu* is *Purana* (to fill). Bone marrow and neurons can be *Sthanastha Majja Dhatu*. So potassium, magnesium phosphates are known as *Margaga Majja Dhatu*. Level of *Margaga Dhatu* is maintained with help of Mineral corticoids (Adrenal secretion) and Adrenalin, noradrenalin, acetylcholine[21] known as

Table 3: Clinical Implementation of *Dhatwagni*

Dhatu	*Karma*	*Sthanastha Dhatu*	*Margaga Dhatu*	*Dhatwagni*		Drugs Acting On *Dhatwagni*[22]	
						Depana	*Pachana*
Rasa	*Preenana*	Plasma	Blood Sugar	*Rasagni*	Insulin (Pancreatic hormone), thyroxine (Thyroid H.)	*Ajamoda, Lasun, Amalaki, Pippali*	*Gaja Pippali, Marich, Chvya, Pippali*
Rakta	*Jivanam*	Erythrocytes	Hb%	*Raktagni*	Erythropoietin, thyroxine, Interleukin-3	*Loha, Mandoora, Kasees, Bhringaraja, Swarnamakshika*	*Manjista, Guduchi, Nimba Kirattatiktha, Karavellaka Bhallataka*
Mamsa	*Lepana*	Muscle tissues	Protein	*Mamsagni*	Pepsin, trypsin, Chymotrypsin, carboxypeptidases (Pancreatic enzymes)	*Mamsa Rasa, Kooshmanda, Arjun, Mudga, Masha*	*Kanchanara Mamsarohini Bhallataka, Swarnaka, Guggulu*
Meda	*Snehana*	Adipose tissues	Lipids	*Medogni*	Glucocorticoid (Adrenal Cortex), lipolytic enzyme (Pancreatic enzyme)	*Tila thail Ghritha*	*Guggulu, Palandu, Naadi Hingu, Sallaki, Saala.*
Asthi	*Dharana*	Bones and cartilages	Calcium and Phosphorus	*Asthyagni*	Parath Hormone (Parthyroid H.), Calcitonin (Thyroid H.), 1,25 dihydroxy cholecalciferol	*Asthisamhara Silajit, Laksha Ksheera, Suddha Vargi*	*Bala, Triphala, Kanchanara Guduchi, Bhallataki*
Majja	*Purana*	Bone marrow and neurons	Minerals	*Majjagni*	Mineral corticoids (Adrenal Cortex), Adrenalin, Noradrenalin, acetylchotin	*Ghrita, Vasa, Majja, Tarunasthi*	*Rohitaki, Sarapunkha, Guduchi*
Shukra	*Garbhotpadana*	Testis and ovaries (reproductive organs)	Oestrogen, Progesterone, testosterone	*Shukragni*	FSH, LH (Pituitary H.)	*Ksheera, masha, All Sukrajanakas*	*Bhallataka, Vacha*

Majjagni.

Shukragni: Function of *Shukra Dhatu* is *Garbhotpadana* (reproduction). As oestrogen, progesterone, testosterone helps in reproduction, known as *Margaga Shukra Dhatu*. Level of oestrogen, progesterone,and testosterone is maintained with help of follicle stimulating hormone (FSH)andLuteinizing Hormones (LH).[21] These are known as *Shukragni*.

This concept formed the basis ofstudy which helps in understanding *Samprapti* (pathogenesis) of diseases and deciding line of treatment.

Conclusion

After detail discussion on concept of *Dhatwagni* and its clinical manifestation, it is concluded that *Dhatwagnis* can be compared with hormones and enzymes as the function of both are same i.e. metabolic transformation. This concept enables a proper appreciation of the possible scientific implementation of these *Ayurvedic* concepts.

Principles of *Ayurveda* which are interwoven with basic concept of life have significant value even in the life of modern men. But nowadays,

those principles are not followed leading to many metabolic diseases. Metabolic diseases such as *Prameha* and hypothyroidism are increasing day by day. This concept of *Dhatwagni* is helpful in understanding *Samprapti* of those diseases and deciding proper line of treatment.

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