

PHYSIOLOGICAL UNDERSTANDING OF PANCHA PITTA

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ABSTRACT

Ayurveda considers *dosha dhatu mala* the root factor for a living body. Their normal functions maintain homeostasis in the living body, and their imbalance leads to disease.

The word pitta is derived from the root word “*Tap santape*”, which refers to “Heat”. In the body, *Agni* and *Pitta* are considered identical entities. So, *Pitta dosha* can be one such body entity that helps in the “Biotransformation” by which the energy is produced. It is concerned with the process of conversion, consumption and any other changes that are taking place in the body. Acharya Sushruta was the first person to talk about *Pancha pitta* as *Agni*. All the sciences and philosophies, in one way or another, are searching for the ultimate truth of life. Health is essential to keep a person fit for work. Describing the healthy (*swastika*), Sushruta says the balance between various physical entities, *Dosha, Dhatu, Mala, Agni, Atma*, and *Kendriya Manas*, is necessary, where the *Agni* plays a prime role in maintaining the normalcy of all these entities. *Acharya Sushruta* was the first person to talk about *Pancha pitta* as *Agni*. *Acharya Charaka* classifies *Pitta* based on its different functions.

Keywords: *Pitta, Agni*, Biotransformation

INTRODUCTION

The word ‘Pitta’ is derived from the Sanskrit root “Tap”. The root word ‘Tap’ has three meanings:

1. ‘tap dahe’ means to ‘burn’, 2. ‘tap santape’ means ‘heat generator’, 3. ‘tap Aishwarya’ indicates able to procure ‘eight types of attainments’ of a *yogi* (*Animadi Aishwarya*). *Dahana* denotes transformation or conversion (*Paka*) in the living body¹. This explains why the function of *Pitta* is transforming or modifying one substance to another. In the body, *Agni* and *Pitta* are considered identical entities.² So *Pitta dosha* can be one such body entity that helps in the “Biotransformation” by which the energy is produced. It is concerned with the process of conversion, consumption and any other changes that are taking place in the body.³

FUNCTIONS OF PITTA⁴

Pitta has an independent function to perform within the body. The principal function of *Pitta dosha* is to

maintain normal physiology by supplying energy to the body for all processes. The unique functions of *Pitta* are:

- Vision (*Darshana*)
- Digestion (*Patti*)
- Feeling of hunger (*kshudha*)
- Thirst (*trishna*)
- Softness within the body (*dehamardava*)
- Lusture of the body (*Prabha*)
- Cheerfulness (*prasada*)
- Intelligence (*medha or buddhi*)
- Maintenance of average body temperature (*mat-ratvam ushmana*)
- Normal complexion of skin (*Prakrita varna*)
- Courage (*shauryam*)
- Anger (*krodha*)
- Desire of food (*Ruchi*)
- Discriminative power and understanding (*dhi*)

SITES OF PITTA

ASHTANGA HRIDAYA	ASHTANGA SANGRAHA	CHARAKA	SUSHRUTA
Nabhi	Nabhi	-	Pakwamashaya Madhyagam
Amashaya	Amashaya	Amashaya	-
Sweda	Sweda	Sweda	-
Lasika	Lasika	Lasika	-
Rudira	Rudira	Rudira	-
Rasa	-	Rasa	-
Drik	Chakshu	-	-
Sparshanam	Sparshanam	-	-

AIMS AND OBJECTIVES

Understanding of subtypes of *Pitta* in relation to modern physiology.

MATERIALS AND METHODS

Five types of *Pitta* have been described as *Agni* in *Sushruta Samhita sutra sthana* in *Dosha –Dhatu-Mala kshaya vridhhi vijnanam*, in *Ashtanga sangraha sutrasthana Dosha bhediya adhyaya*, and *Sharangadhara Poorva khanda kaladikakhyana adhyaya*. Present work is done based on critical review of classical information, published research works, and mod-

ern literature. The possible correlation is made between collected information and has been presented in a systematic way.

DISCUSSION

1. PACHAKA PITTA

The *Visheshha Sthana* of *Pachaka Pitta* is said to be between *Pakwashaya* and *Amashaya* near *Jatharagni*.⁵ The primary function of *Pachaka Pitta* is said to be the digestion of the ingested food. The functional area of *Pachaka pitta* is said to be in *Pittadhara kala*.⁶ Even

though *Pachaka pitta* is composed of Pancha mahabhutas, due to the predominance of *Tejasa guna*, its *dravata* is lost. Hence, it is known by the name *Anala*, which means nothing but *Agni*. It can digest all four types of *Annapurna* and does *Sara kitta vibhajana*. This significant function of *Pachaka pitta* also nourishes all the other subtypes of *Pitta*.

Digestion⁷: Mechanical and chemical processes break down ingested food into small molecules. In mechanical digestion, the teeth cut and grind food before it is swallowed, and then smooth stomach and small intestine muscles churn the food. As a result, food molecules become dissolved and thoroughly mixed with digestive enzymes. In chemical digestion, food's large carbohydrate, lipid, protein, and nucleic acid molecules are split into smaller molecules by hydrolysis. The functions of *Pachaka Pitta* can be related to the functions of digestive enzymes, Gastrointestinal hormones and local hormones. Examples are enzymes and hormones secreted from the stomach (HCL), small intestine (succus entericus), and pancreas(pancreatic juice).

2. RANJAKA PITTA

According to *Acharya Vagbhata*, *Ranjaka, pitta* is located in the stomach, i.e. *Amashaya*⁸, and as per *Acharya Sushruta*, it is found in the liver and spleen, i.e. *Yakrut* and *Pleeha*.⁹

Yakrut and pleeha (liver , spleen)-

Being located in the liver, *Ranjaka pitta* is said to impart color to the *Rasa* when it passes through the liver.

Amashaya (stomach, duodenum, small intestine) –

As per *Acharya Vagbhata Pitta*, located in *Amashaya*, is called *Ranjaka pitta* as it imparts color to the *Rasa*. Physiologically, the Intrinsic factor of the castle is located in the stomach and the duodenum (Brunner's gland of the duodenum). It is a glycoprotein secreted by the parietal cells of gastric mucosa. It has a vital role in absorbing Vit.B12 in the intestine. Failure to produce or use this intrinsic factor by the human body results in Pernicious Anemia, where insufficient RBCs are produced¹⁰. Thus, the inherent factor of the castle seems to be closer than the *Ranjaka pitta*, which *Vagbhata* explained as existing in the stomach.

Iron broken down from Heme is degraded into Iron and Porphyrin; Iron is stored in the body as ferritin and hemosiderin, which is reutilized for the synthesis of Hb¹¹. Thus, the breakdown of RBCs in the spleen and the storage of iron in the liver, which in turn helps in the formation of hemoglobin, can be considered as the *Ranjaka pitta*, explained by *Sushruta* as located in *Yakrit* and *Pleeha*.

2. SADHAKA PITTA

It is one among the sub types of *Pitta* associated with certain mental faculties and emotions. The word *Sadhaka* is derived from the root word 'Saadha'- which means 'to accomplish' . It is the one which helps to achieve *Chaturvidha Purushartha* i.e. *Dharma, Artha, Kama and Moksha* ¹².

Sthana and Karma¹³ - It is located in the *Hridaya* and it is responsible for intelligence (*Buddhi*), memory (*Medha*), self-esteem (*Abhimana*), enthusiasm (*Utsaaha*). *Pitta* located in *Hridaya* is known as *Sadhakagni* and its function is to enable one to achieve one's own aspirations. It dispels the *Kapha* and *Tamas* from *Hridaya* and enables the *Manas* to perceive the things clearly . It also enables the reception of *Shabdha, Sparsha, Gandha* etc.

Sthana as Hridaya (Heart) –

Term *Hridaya* consists of 3 Sanskrit roots – *Hr- Ha-rana* – receiving; *Da- Dana*– giving away/ in, *Ayana* – moving . As per *Ayurveda Hridaya* ie heart, is the seat of *Chetana ,Buddhi ,Mana*. The *Manovaha srotas* which exits from *Hridaya* moves to *Sarva shareera* ¹⁴.

Recent research works shows that the Natriuretic hormones Atrial natriuretic peptides (ANP) secreted from right atrium , Brain natriuretic peptide (BNP) secreted from ventricles of heart, CNP produced by the endothelium of heart . These substances induce the kidney to secrete sodium and therefore participate in regulation of sodium and water homeostasis. Sodium play an important role in brain function. A rapid influx of sodium gives the inside of the nerve cell an electrical charge setting off an action potential.

Without sodium brain cannot initiate the electrical impulses to the nerve cells for the proper communication.

They were also proven to have neuro modulatory functions.

Hridaya as Brain –

Buddhi, *Medha*, *Abhimana*, *Abipretartha Sadhana* are the *manovisheshas*.ie, qualities specific to mind and are supposedly operated from brain (*masthishka*). One can achieve their aims and ambitions only when all higher centers work in a coordinated way.

Pre frontal cortex- Functions¹⁵

It is the anterior part of frontal lobe of cerebral cortex, in front of areas 8 and 44. This area has numerous connections with other areas of the cerebral cortex, thalamus, hypothalamus, limbic system, and cerebellum. It forms the Centre for the higher functions like emotion, learning, memory and social behavior. Short-term memories are registered here. It is the Centre for planned actions, it is the seat of intelligence; so, it is also called the organ of mind. It is responsible for the personality of the individual, various autonomic changes during emotional conditions, because of its connections with hypothalamus and brainstem.

Injury or ablation of prefrontal cortex leads to a condition called frontal lobe syndrome. Emotional instability, Lack of concentration, lack of initiation, Impairment of recent memory, loss of moral and social sense. There is failure to realize the seriousness of the condition in this syndrome.

Neurotransmitters¹⁶

These are the chemical substances that act as mediators for the transmission of nerve impulses from one neuron to another neuron through synapses. Here are few examples with their involvement in different functions

1. Norepinephrine (NE) - Plays roles in arousal (awakening from deep sleep), dreaming, and regulating mood.
2. Dopamine (DA) - Is active during emotional responses, addictive behaviours, and pleasurable experiences.
3. Serotonin- Involved in sensory perception, temperature regulation, control of mood, appetite, and the induction of sleep.
4. Nitric oxide (NO) – It plays a role in memory and learning.

4. ALOCHAKA PITTA

Alochaka means ‘that which helps to see’ or that which ‘helps to think’. The word *Alochaka* is made up of the term *lochana* which is a synonym of ‘eye’ and *Alochana* means to ‘see and think’. *Drishti* or eyesight is the seat of *Alochaka pitta*¹⁷. *Drishti* means vision, that which enables us to see things around us and perceive them in right sense. This perception happens in eye; hence eye is the seat of *Alochaka pitta*.

Alochaka pitta doesn’t only refer to the anatomical eye, but also the physiology of vision. It resides in all those parts of eye which are responsible in visualizing the objects and interpreting the objects as they are.

As per *Acharya Bhela*, *Alochaka pitta* renders its functions through two components¹⁸

1. ***Chakshurvaisheshika*** – that which does the *Grahana* of *Lakshana*, *Samsthana*, *Svaroopa*, *Varna* by the help of *Athma Manas sannikarsha* for example, the *varna*, *lakshana samsthana*, *roopa* of *phala* and *pushpa*.
2. ***Buddhirvaisheshika*** - present between *Bhrumadhya* (between 2 eyes) in *Shringhataka* which does the *sukshma artha grahana* of objects and converts it into *smriti*. Whenever needed that will be again recalled from the *smriti*. It can also be called *Manodrishti*.

The pathway from photoreceptors (rods and cones)-retina-optic nerve-optic chiasma-dorsal lateral geniculate nucleus of the thalamus-geniculocalcarine tract to the primary visual cortex is called an optic pathway¹⁹. The communication in this pathway is carried out by neurotransmitters which may be represented as *Chakshyu vaisheshika pitta*.

Buddhi vaisheshika pitta provides knowledge regarding past experience and differentiate the things from each other to compare with previous experience. It also stores the information for future use. *Buddhi vaisheshika pitta* acts at the molecular level to communicate between the cortical and subcortical structure of the brain for which there is happening of differentiation, comparison, or remembrance of knowledge. *Buddhi visheshika pitta* performs its function even after the formation of *buddhi* and *smriti*

The photosensitive manufactured substances in the eye called photopigment and the whole compound cycles drew in with the photochemistry of vision, neurotransmitters related to the visual pathway from the retina to the visual cortex may be tended to as *Alochaka pitta*. The Brodmann areas 17,18,19 are the visual cortices of occipital lobe which interprets the visualized things in brain. (*Buddhirvaisheshika*)²⁰

5. BHRAJAKA PITTA

The Pitta which is responsible for the production of “*Bha*” (complexion) of skin is called *Bhrajaka*. It is mentioned that the production of normal and abnormal temperature of the body as well as normal and abnormal color of the skin which is mentioned as among the functions of *Pitta* are attributed to *Bhrajaka Pitta*²¹

Functions of *Bhrajaka Pitta*:-

1. Responsible for complexion of the skin
2. Responsible for regulation of body heat
3. Causes the digestion and utilization of substances which are applied as *Abhyanga*, *Parisheka*, *Alepa* etc over the skin
4. Enhances the glow of ones on natural complexion

Melanocytes²²: Only Melanin producing cells in the body are Melanocytes present primarily in the skin and eyes. The number of Melanocytes is about the same in all people. The amount of Melanin produced and transferred to Keratinocytes determines the differences in skin color. Melanocytes synthesize Melanin from amino acid Tyrosine in the presence of an enzyme called Tyrosinase in the organelle called Melanosome.

Melanocyte Stimulating Hormone (MSH)²²: MSH is secreted by the intermediate lobe of Pituitary gland. An increase in MSH will cause the darkening of the skin color. ACTH and MSH share the same precursor molecule, Pro- opiomelanocortin(POMC)

Hemoglobin²²: Light- skinned individuals have less Melanin in the Epidermis. Epidermis appears translucent and skin color ranges from pink to red depending on the Oxygen content of the blood moving through the capillaries of the Dermis. Red color is due to Hemoglobin, the Oxygen carrying pigment in Red Blood

Cells. The amount and nature of Hemoglobin that circulates in the cutaneous blood vessels play an important role in the coloration of the skin.

Carotene²²

Carotene is a yellow orange pigment, which is the precursor of Vitamin A, used to synthesis pigments needed for vision. Stored in Stratum Corneum and fatty areas of Dermis and Subcutaneous layer.

Bhrajaka pitta located in the skin is responsible for production of normal and abnormal color of the skin as well as normal and abnormal body temperature. MSH secreted from Pituitary regulates the Melanin production from the Melanocytes located in the Epidermis of skin. Skin which is said as the seat of *Bhrajaka Pitta* plays the major role in regulation of body temperature in response to any change in external or internal environment with the help of sweat and pigment Melanin.

CONCLUSION

Pitta has the independent function to perform within the body. The principal function of *Pitta dosha* is to maintain normal physiology by supplying energy to the body for all processes.

The functions of *Pachaka Pitta* can be related to the functions of digestive enzymes, Gastro-intestinal hormones and local hormones ie, Enzymes and hormones secreted from stomach (Hcl), small intestine (succus entericus), Pancreas(pancreatic juice) .

The intrinsic factor of castle seems to be closer comparison to the *Ranjaka pitta* explained by *Vagbhata* as existing in stomach. Iron broken down from Heme is degraded into iron and porphyrin ; iron is stored in body as ferritin and hemosiderin, which is reutilized for synthesis of Hb. Thus, breakdown of RBCs in spleen and storage of iron in liver which in turn helps in formation of hemoglobin can be considered as the *Ranjaka pitta* explained by *Sushruta* as located in *Ya-krit* and *Pleeha*.

Sadhaka pitta is the one whose functions are very much similar to the functions of higher centers of the brain carried out by different neurotransmitters. And also, as per the recent studies the Natriuretic hormones secreted from the atria and ventricles of the heart

which has their prime role in sodium water balance can also be considered under *sadhaka pitta* if we consider its *sthana* as heart(*Hridaya*)

The photosensitive manufactured substances in the eye called photopigment and the whole compound cycles drew in with the photochemistry of vision, neurotransmitters related to the visual pathway from the retina to the visual cortex may be tended to as *Alochaka pitta*.

The pigments of the skin which are responsible for coloring the skin can be considered under *Bhrajaka pitta* ie, MSH, Melanin, Carotene, Hemoglobin.

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