



## Review Article

www.ijrap.net (ISSN:2229-3566)



### SADHAKA PITTA OF AYURVED AND ITS AFFILIATES IN MODERN PERSPECTIVE: A REVIEW

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Received on: 10/09/20 Accepted on: 21/10/20

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DOI: 10.7897/2277-4343.1106187

#### ABSTRACT

In *Ayurveda* a person is said to be healthy when *Dosha*, *Agni*, *Dhatu*, all the physiological process are in homeostatic state and soul, sense organ and mind are in a state of total wellbeing. Theory of *tridosha* is a unique concept to *Ayurveda*. *Pitta dosha* plays a major role in digestion and metabolism. *Pitta doshas* are of five types namely *pachaka*, *ranjaka*, *alochaka*, *bhrajaka*, and *sadhaka pitta*. The seat of *Sadhaka pitta* is *hridaya* and it is associated with mental faculties and emotions. These functions can be recognized as functions of higher center of brain which is carried out by small molecule, rapidly acting transmitters and neuropeptides or slowly acting neurotransmitters. Few works have been mentioned on conceptual features of *pitta*. In this article a correlation of the physiological activity of *sadhaka pitta* with modern medical science has been mentioned.

**Keywords:** *Ayurved*, *Buddhi*, *Hridaya*, *Mana*, Neurotransmitter, Neuropeptide, *Sadhaka pitta*

#### INTRODUCTION

Theory of *Tridosha* is a unique theory in indigenous system of medicine. *Pitta* in general does the bodily functions related to digestion and metabolism. All metabolic and catabolic activities, biochemical reactions, and the process of energy exchange are due to *pitta*. There is always involvement of *pitta dosha* in every reaction or changes take place inside our body. *Pitta dosha* is present at all level of organizations i.e., cellular level, single system level and organization level<sup>1</sup>. *Pitta dosha* do not move in the body independently. It is circulated all over the body with the help of *vata dosha*. In modern physiology it has been mentioned that the basic theory of body's control system allows the functional system to operate in support of one another. *Pitta dosha* has been divided into five types on the basis of location namely *pachaka*, *ranjaka*, *sadhaka*, *alochaka*, *bhrajaka pitta*. All these five type of *pitta doshas* have their different location and functions as well<sup>2</sup>. *Sadhaka pitta* is related with all type of mental functions and behavior. The word *sadhaka* is derived from the root word "*saadha*" which means to accomplish. It is located in *hridaya* and is responsible for intelligence, memory, self-esteem, enthusiasm and for the achievement of one's own aspiration. On the basis of functional understanding in modern science small molecule, slow and rapid acting transmitters are the substances responsible for all mental faculties, emotions, enthusiasm and memory.

*Sadhaka pitta* cannot be represented by a single entity at all the time. There are variations in the functions of *sadhaka pitta*. Based on the functions of *sadhaka pitta*, we can identify a variety of

chemical factors based on contemporary modern medical sciences responsible for the same functions. *Ayurveda* is the science based on the concept of functional understanding of the body, by considering its functions, the entities representing can be assumed. In these modern era students particularly first year of Bachelor of *Ayurvedic* Medicine and Surgery face a lot of problem in understanding the basic concept of *Ayurveda*. There is no specific correlation of *Sadhaka pitta* mentioned in *Ayurvedic* literature in terms of supporting modern literature. Increased demand of *Ayurveda* science is required to understand the depth of *Ayurvedic* principles on criterion of modern medical science in an easy mode.

*Acharya Charaka* has mentioned the function of *hridaya* in reference to *rasa rakta samvahana*. In this context *Vyana vayu* ejects *rasa* (blood) from *hridaya* (Heart) and circulates it all over the body<sup>3</sup>. Again, *Acharya Charaka* has mentioned about *Hridaya* in *arthedashamahamuliya adhyaya*. *Shadanga* (six divisions of the body, i.e., four limbs, head, and torso), internal organs, consciousness, motor and sensory organs, five objects of sensory perceptions, and the soul (along with its attributes such as joy, etc.), mind and objects of the mind are all located in the *Hridaya* (heart)<sup>4</sup>. All these mental functions are related to brain. *Sadhaka pitta* is located in *Hridaya* and it is associated with mental faculties and emotions. All the mental functions are achieved due to bio-chemicals secreted in brain. In this review we are trying to identify bio-chemicals based on its physiological functions retrospectively described under the function of *Sadhaka pitta*.

Table 1: Site and functions of *Sadhaka pitta* by different *Acharya*

Classical Textbook Reference	<i>Sthana</i> (Location)	<i>Karma</i> (Function)
<i>Charaka Samhita</i> ( <i>Chakrapani teeka</i> on <i>C.Su.12/11</i> ) <sup>5</sup>	<i>Hridaya</i>	<i>Shaurya, Harsha, Moha, Bhaya, Krodha</i>
<i>Sushruta Samhita</i> ( <i>Dalhana teeka</i> on <i>Su. Su.21/10</i> ) <sup>6</sup>	<i>Hridaya</i>	Helps to achieve one's <i>manorath</i> and <i>purushartha</i> ( <i>Chaturvarga prapti</i> ) It removes the <i>kapha</i> and <i>tama</i> in <i>hridaya</i> and increases the <i>satwa guna</i> and enables the <i>Manas</i> to perceive the things clearly.
<i>Sushruta Samhita</i> ( <i>Dalhana teeka</i> on <i>Su.su.15/4</i> ) <sup>7</sup>	<i>Hridaya</i>	<i>Ojakrita, Medha</i>
<i>Ashtanga Hridaya</i> ( <i>Sarvangasundari teeka</i> on <i>A.H.Su.12/13</i> ) <sup>8</sup>	<i>Hridaya</i>	To achieve the intended objects with <i>Buddhi</i> (intelligence) <i>Medha</i> (discriminative ability) <i>Abhimana</i> (self-esteem)
<i>Ashtanga sangraha</i> <sup>9</sup>	<i>Hridaya</i>	Person feels enthusiastic in work related to <i>Buddhi</i> (intelligence) <i>Medha</i> (discriminative ability) <i>Abhimana</i> (self-esteem), to achieve the fulfillment of desire. In <i>Sashilekha teeka</i> , Commentator Indu has mentioned <i>buddhi</i> is the cause to achieve the <i>Bahya abhipretartha</i> in the form of memory.
<i>Madhava Nidana</i> ( <i>Atanka darpana arshonidan</i> ) <sup>10</sup>	<i>Hridaya</i>	Responsible for <i>Buddhi</i> (intelligence) and <i>Medha</i> (discriminative ability)
<i>Sharangadhara Samhita</i> <sup>11</sup>	<i>Hridaya</i>	Responsible for <i>Buddhi</i> (intelligence) <i>Medha</i> (discriminative ability) ( <i>Medha pragyankar</i> ).
<i>Bhavprakash Nighantu</i> <sup>12</sup>	<i>Hridaya</i>	<i>Kaphatamo apanadanmo</i> (pacify the excess <i>kapha</i> and <i>tama</i> )
<i>Bhela Samhita</i> <sup>13</sup>		To achieve <i>Chaturvarga</i> ( <i>Dharma, Artha, Kama, Moksha</i> ) by confirming <i>Shabda, Sparsha, Gandha artha, Kama deva-pitru-rishigana</i> , substrate of this <i>Loka</i> and other by its own <i>Yukti</i> .

### Modern aspects

The site of *Sadhaka pitta* is *hridaya*. The function of *sadhaka pitta* is to achieve the intended objects with *Buddhi* (intelligence) *Medha* (discriminative ability) *Abhimana* (self-esteem). *Sadhaka pitta* also helps to achieve one's *manorath* and *purushartha* (*Chaturvarga prapti*). *Acharya Sushruta* has mentioned the appearance of *hridaya* (Heart) is similar to that of an inverted bud of lotus<sup>14</sup>. The location of *rasa* is *hridaya*. *Acharya Charaka* has mentioned *Vyana vata* makes *rasa dhatu* (blood) to get forcefully ejected from the heart and circulated all over the body to perform its functions.

The circulating Neuropeptides present in the blood act all over the body accordingly. *Vyana vata* control autonomic functions of heart in association with *Prana vayu*. Rate and rhythm of heart change with emotion. *Acharya Chakrapani* has mentioned *Mana* and *atma* is situated in *hridaya* and the knowledge of *Sukha, Dukha etc* is achieved by *atma* in *hridaya*<sup>15</sup>. In modern science it has been mentioned, emotions are developed by limbic system in brain because function of mind (*mana*) is regulated by brain (cortex). These emotions influence the heart. It is well known; all pleasant or unpleasant emotions influence the heart. This is due to the chemicals release in brain during emotions. In *Samhitas* all the ancient *acharyas* have mentioned *Siro roga* and *hridaya roga* separately. *Acharya Charaka* has mentioned *trimarma* as *shiro* (head), *hridaya* (heart) and *basti* (bladder). *Shiro* is also termed as *uttamanaga*. So, *Acharyas* had a good idea of these two organs separately.

*Buddhi* is one of the functions of *sadhaka pitta*. *Buddhi* is developed as a complex process of *Chintya* (thought), *Vicharya* (consideration), *uhya* (hypothesis), *dheya* (attention) and *sankalpya* (determination)<sup>16</sup>. In modern science a thought results from a "pattern" of stimulation of the cerebral cortex, thalamus, limbic system, and upper reticular formation of the brain stem. It may be concluded that all these five processes of *mana* are progressed by the simultaneous integration of cerebral cortex, thalamus, limbic system, and upper reticular formation of the brain stem. *Buddhi* cannot develop without *uhapoha* (hypothesis) and *vichara* (consideration), which comes through *smriti* or past experiences. *Buddhi* is of two types namely *Kshanika* and *nischyatmika*<sup>17</sup>. Thoughts may be important or unimportant. Important one is stored in the cortex for maximum period called

*Nischayatmika buddhi*. Unimportant one is stored for a short period called *kshanika buddhi*.

*Mana* (Mind) is active but devoid of consciousness, while the *Atma* (soul) is conscious but not active. *Ichha* (Desire), *Dvesha* (envy), *Sukha* (happiness), *Dukha* (misery), *Prayatna* (effort), *Chetana* (consciousness), *Dhriti* (stability), *Buddhi* (intellect), *Smriti* (memory) and *Ahankara* (ego) are perceived by *atma*. These signs are available in all living beings which proofs the existence of *atma*<sup>18</sup>. All these functions are higher mental functions of brain. To perceive this neurotransmitter and neuropeptides are responsible and it does at molecular level. It is responsible for communication between neurons of brain and other parts of the body. As a result, *sourya, harsha, utsaha, buddhi, medha, abhimana* occurs which is the function of *sadhaka pitta*. By the help of *buddhi, medha* and *abhimana* all the motor functions are performed to achieve the person's desire.

Several limbic structures are concerned with affective nature of sensory sensation either the sensations are pleasant or unpleasant. Certain areas of limbic system satisfy the animal and makes happy and others cause terror, pain, fear, and defense. The degree of stimulation of these two also affects the behavior of animal. Major reward center is present in lateral and venteromedial nuclei of hypothalamus and less reward center is present in septum, amygdale, certain area of thalamus, basal ganglia of limbic system. Most potent punishment center is present in Central grey area surrounding the aqueduct sylvius in the mesencephalon, periventricular zone of hypothalamus and thalamus and less potent punishment center is present in amygdala and hippocampus<sup>19</sup>. The degree of stimulation of these oppositely responding systems greatly affect the behavior of the animal. Norepinephrine and serotonin system normally provide drive to the limbic areas of the brain to increase a person's sense of wellbeing, and to create happiness, contentment, good appetite, appropriate sex drive and psychomotor balance. It proves pleasure and reward centers of the hypothalamus and surrounding areas receive large number of nerve endings from the norepinephrine and serotonin systems<sup>20</sup>.

The bulboreticular facilitatory area present in pons and mesencephalon transmit facilitatory signal downward to the spinal cord and upward direction first to thalamus, subcortical area and cerebral cortex. The level of activity of excitatory area

in the brain stem is determined by the number and type of sensory signal that enter the brain from the periphery. The signals that pass-through thalamus, subcortical area, cerebral cortex are communicated by the neurotransmitter. It may be slowly acting or rapidly acting transmitters. Action of hormone /neurotransmitter depends upon the specific receptor present in the target cell. The first action is to bind the specific receptor. Cells that lack receptor for the hormone do not respond. There are 2000-100000 receptors present in every cell. Each receptor is highly specific for single hormone/neurotransmitter<sup>21</sup>.

There are multiple neurohormonal systems present in brain. Activation of each of the system plays its own role in controlling different quality of brain function. Some of the important neurohormonal systems are given below.

- Locus ceruleus and the norepinephrine system
- The substantia nigra and dopamine system
- The raphe nuclei and serotonin system
- The gigantocellular neurons of the reticular excitatory area and acetylcholine system

There are two group of synaptic transmitters one is small molecule rapidly acting transmitter other one is large molecule slowly acting transmitter or neuropeptide. The small molecule rapidly acting transmitter cause most acute response of the nervous system like transmission of sensory signal to the brain and of motor signal back to muscle. The neuropeptide causes prolonged action like long term changes in number of neuronal receptors, long-term opening or closure of certain ion channels and even long term changes in number of synapses or sizes of synapses<sup>22</sup>.

#### Small molecule rapidly acting transmitters

- Acetylcholine is secreted by neurons in many areas of the nervous system specifically by the terminals of large pyramidal cells from the motor cortex, several neurons in the basal ganglia, the motor neurons that innervate the skeletal muscle, preganglionic neurons of the autonomic nervous system, the post ganglionic neurons of the parasymphathetic nervous system, some of the post ganglionic neuron of sympathetic nervous system. It has an excitatory effect on most of the organ however it has an inhibitory effect on heart by the vagus nerve.
- Locus ceruleus is a small area located at the juncture between pons and mesencephalon. Nerve fibre from this area spread throughout brain and secretes norepinehrine. Generally, norepinephrine excites the brain to increase its activity, but it has inhibitory effects in a few brain areas because of inhibitory receptors present at certain neuronal synapse. It plays an important role in dreaming thus leading to REM sleep. It sends nerve fibres to widespread areas of the brain to help control over activity and mood of the mind such as increasing level of wakefulness. Norepinephrine is also secreted from most postganglionic neurons of the sympathetic nervous system where it excites. Adrenal medulla secretes epinephrine and norepinephrine in response to sympathetic stimulation. The sympathetic action is also called as fight or flight reaction.
- Neurons of substantia nigra send nerve endings to caudate nucleus and putamen of cerebrum to secrete dopamine. They also send their endings to hypothalamus and limbic system. Dopamine is generally inhibitory transmitter in brain but in some area it is excitatory.
- *Glycine* is secreted mainly at synapses in the spinal cord. It acts as an inhibitory transmitter.

- *GABA* (*gamma-aminobutyric acid*) is secreted by nerve terminals in the spinal cord, cerebellum, basal ganglia, and many areas of the cortex. GABA is inhibitory neurotransmitter.
- *Glutamate* is secreted by the presynaptic terminals in many of the sensory pathways entering the central nervous system, as well as in many areas of the cerebral cortex. It probably always causes excitation.
- *Serotonin* is secreted by nuclei that originate in the median raphe of the brain stem and project to many brain and spinal cord areas, especially to the dorsal horns of the spinal cord and to the hypothalamus. Serotonin acts as an inhibitor of pain pathways in the cord and has inhibitory action in the higher regions of the nervous system is believed to help the control of mood in a person, perhaps even to cause sleep. *Acharya Charaka* has mentioned in human beings, *Sukha* (happiness), *Dukha* (misery), *Pushti* (nourishment) and *Karshya* (emaciation), *Bala* (strength) and *Abala* (weakness), *Vrishata* (fertility) and *Klibata* (infertility), *Gyana* (knowledge) and *Agyana* (ignorance), and *Jivita* (life) and *Mrityu* (death) depend upon proper and improper sleep. Untimely, excessive sleep and sleep deprivation take away both happiness and longevity from a person. Similarly, proper sleep brings about happiness and longevity in human beings just as real knowledge brings about spiritual power in yogis. All these emotional factors are obtained by *prakrit* and *vaikrit sadhaka pitta*.
- Nitric oxide is especially secreted by nerve terminals in areas of the brain responsible for long-term behavior and for memory. Therefore, this transmitter system might in the future explain some behavior and memory functions. Nitric oxide is different from other small molecule transmitters in its mechanism of formation in the presynaptic terminal and in its actions on the postsynaptic neuron. It is not preformed and stored in vesicles in the presynaptic terminal as are other transmitters. Instead, it is synthesized almost instantly as needed, and it then diffuses out of the presynaptic terminals over a period of seconds rather than being released in vesicular packets. Next, it diffuses into postsynaptic neurons nearby. In the postsynaptic neuron, it usually does not greatly alter the membrane potential but instead changes intracellular metabolic functions that modify neuronal excitability for seconds, minutes, or perhaps even longer<sup>23</sup>.

#### Neuropeptides

The neuropeptides are generally a thousand or more times as potent as the small molecule transmitters. They often cause much more prolonged actions. Some of these actions include prolonged closure of calcium channels, prolonged changes in the metabolic machinery of cells, prolonged changes in activation or deactivation of specific genes in the cell nucleus, and/or prolonged alterations in numbers of excitatory or inhibitory receptors. These neuropeptides are also responsible for mental functions.

Some of the neuropeptides are given below:

Hypothalamic releasing hormone

- Thyrotropin releasing hormone
- Luteinizing releasing hormone
- Somatostatin (Growth hormone inhibitory factor)

Pituitary peptides

- Adenocorticotropic hormone
- $\beta$  endorphins

- $\alpha$  melanocyte stimulating hormone
- Prolactin
- Luteinizing hormone
- Thyrotrophin
- Growth hormone
- Vasopressin
- Oxytocin

#### Peptides that act on gut and brain

- Leucine enkephalin
- Methionine enkephalin
- Substance p
- Gastrin
- Cholecystokinin
- Vasoactive intestinal polypeptide
- Nerve growth factor
- Brain derived neurotrophic factor
- Neurotensin
- Insulin
- Glucagon

#### From other tissue

- Angiotensin 2
- Bradykinin
- Carnosine
- Sleep peptides
- Calcitonin<sup>24</sup>

These neuropeptides mentioned above are helpful to achieve the desire by performing both bodily and mental functions. The norepinephrine and epinephrine secreted from adrenal gland, neuropeptides are present in the blood and act all over the body. These functions are possible after the ejection of blood from heart with the help of *Vyana vayu*. As the functions of *sadhaka pitta* is to achieve the desire. The desire is completed by performing the motor actions. All the motor functions are performed by the help of neuropeptide at molecular level, so the functions of neuropeptides come under the function of *sadhaka pitta*.

#### **Prana vayu, Sadhaka pitta and Vyana vayu**

According to *Acharya Charaka*, *Prana vayu* is considered as the best *vayu* among all *vayu*. *Prana vata* is located in *Murdha* and it traverses along *uras* (thorax), and *kantha* (throat), it maintains the proper functioning of *Buddhi* (intelligence/judgment), *hridaya* (heart), *indriya* (senses) *Chitta* (mind). *Acharya Vagbhata* annotated *hridaya* as *adhishthana* of *mana*. *Prana* is situated in the head and moves in throat and chest. It controls or maintains the intellect, sense organ, heart/brain, arteries (blood vessel), and functions of supporting, expectoration, sneezing, belching, breathing and swallowing of food. Here *hridaya* is annotated as *adhishthana* of *buddhi* *Adhara bhutam*<sup>25</sup>. *Acharya Charaka* has explained the function of *vata* as *Niyanta praneta cha manash and samirane agni*. It proves that *Vata dosha* controls the *mana* and stimulate the *agni*<sup>26</sup>. Function of *vata* is *utsaha* (enthusiasm). All sense of motivation depends upon *sadhaka pitta* and *vata* especially *Prana vayu*.

*Sadhaka pitta* helps in development of unbiased *buddhi* only when *satva guna* is dominant and *kapha* and *tamo* *guna* are in recessive state. *Sadhaka pitta* removes the *kapha* and *tama* and increases the *satva guna* and enables the *Manas* to perceive the things clearly. It also enables the reception of *Shabdha*, *Sparsha*, *Gandha* etc<sup>27</sup>. This helps to achieve a person's own desire by

following *Chaturvarga*. *Buddhi* developed due to *sadhaka pitta* helps in fulfillment of *chaturvarga* i.e., *dharm*, *artha*, *Kama* and *Moksha*. *Chaturvarga* is achieved by doing some motor activities in the direction of unbiased *Buddhi*. *Vyana vata* makes *rasa dhatu* (blood) to get forcefully ejected from the heart and get circulated all over the body to perform its functions. It controls both somatic and autonomic functions of the body.

Without the cognitive functions, the person might not have the intrinsic knowledge, without thinking for too long a time to respond quickly and appropriately. This cognitive control of motor activity determines subconsciously, and within seconds, which patterns of movement will be used together to achieve a complex goal that might itself last for many seconds. The coordination of *Prana vayu*, *sadhaka pitta* and *Vyana vayu* can be easily understand with a good example of this phenomenon would be a person seen a lion, approach and then responding instantaneously and automatically by-

- Turning away from the lion
- Beginning to run
- Even attempting to climb a tree<sup>28</sup>.

The person run away from the lion is due to cognitive functions developed due to *sadhaka pitta* and *Prana vayu* and *Vyana vayu* helps in run or climb a tree in order to protect his life. A thought results from a pattern of stimulation, communication and integration of cerebral cortex, thalamus, limbic system and upper reticular formation of the brain system. This theory is called the holistic theory of thoughts. The stimulated area of the limbic system, thalamus and reticular formation are determined the general nature of thought, giving it such qualities as pleasure, displeasure, pain, comfort, crude modalities of sensation localization to gross areas of the body and other general characteristics. So, anatomical structures of CNS like limbic system, thalamus, reticular formation may represent *Prana vayu*. To achieve this neurotransmitter and neuropeptides are responsible and it does at molecular level. It is responsible for communication and integration between neurons of brain, between anatomical structures like limbic system of the brain, midbrain, cortex and spinal cord. So, neurotransmitter and neuropeptide like acetylcholine, dopamine, serotonin and norepinephrine may represent the functions of *sadhaka pitta*. The circulating Neuropeptides present in the blood act all over the body with the help of *Vyana vayu* to achieve both autonomic and somatic functions of the body. Autonomic control of *Vyana vayu* controls the cardiac activity, cardiac output and peripheral resistance. Somatic control of *Vyana vayu* controls the motor activity. *Sadhaka pitta* operates in association with *Prana vayu* and *buddhi* is developed. In general, *buddhi* regulates the autonomic and somatic functions of *Vyana vayu* subconsciously and consciously. This proves the basic theory of body's control system allow the functional system to operate in support of one another.

#### **Role of Sadhaka pitta in mental health**

*Acharya Charaka* has mentioned in *pandu roga*, due to *Krodha*, *Kama*, *Chinta*, *Bhaya*, *Krodhahridayastha pitta* is aggravated and spread all over the body by *vata dosha*<sup>29</sup>. *Sadhaka pitta* helps us to fulfill both our goals in life. Disturbed *Prana vata* and *Sadhaka pitta* may lead to psychosomatic disturbances. When homeostatic condition of *Sadhaka pitta* is disturbed due to aggravation of *Pitta*, hyperactivity impatience and anger may be seen. When it is low, the normal functions of energy transformation process, emotions thoughts and feeling may be low. Imbalance of *Sadhaka pitta* causes many disorders related to thought process,

intelligence and discrimination power. The person would lose motivation and would not be able to uptake any task or chase any operation. Decrease in *Sadhaka pitta* would increase in *kapha* and *tama* quality in brain. This leads to depression, lack of motivation, excessive laziness and sleepiness. All activities of daily living would slow down, and person would not be able to achieve anything.

In case of Alzheimer's disease abnormalities of neurotransmitter particularly impairment of cholinergic transmission has been mentioned. As a result, patient is unable to retrieve information acquired in the past. Hence patients suffer with gradual impairment of memory usually in association with disorder of other cortical functions. Anticholinesterases are prescribed to improve cognitive functions because brain Ach levels are markedly reduced<sup>30</sup>.

In Parkinson's disease Reduced dopaminergic output from the substantia nigra to the globus pallidus leads to reduced inhibitory effects on the subthalamic nucleus, neurons which become more active than usual in inhibiting activation of the cortex. This in turn results in bradykinesia. Administration of the drug L-dopa to patients usually ameliorates the symptoms especially rigidity and akinesia<sup>31</sup>. Mental depression psychosis might be caused by diminished formation of norepinephrine or serotonin or both.

Depressed patients experience symptoms of grief, unhappiness, despair and misery. In addition, they also lose their appetite, sex drive and have severe insomnia. Depressive patients can be treated with drugs that increase the excitatory effects of norepinephrine and serotonin at the nerve endings so that these transmitters remain active for longer period after secretions<sup>32</sup>.

In all these psychosomatic cases there is either increase or decrease in action of neurotransmitter and production of *buddhi* and *smriti* is reduced. Either the patient is hyper excitable or depressed. Disoriented mental functions are due to hypo or hyper secretions of neurotransmitters or neuropeptides. So, the functions of neurotransmitter and neuropeptide are similar to the functions of *sadhaka pitta*.

## DISCUSSION

All the metabolic and catabolic activities, biochemical reactions and the process of energy exchange are due to *pitta*. *Pitta doshas* are of five types namely *pachaka*, *ranjaka*, *alochaka*, *bhrajaka*, and *sadhaka pitta*. The site of *Sadhaka pitta* is *hridaya*. *Sadhaka pitta* (bio chemicals) plays important role in development of *buddhi* and also helps to achieve the intended objects with *Buddhi* (intelligence) *Medha* (discriminative ability) *Abhimana* (self esteem). *Sadhaka pitta* also helps to achieve one's *manorath* and *purushartha* (*Chaturvarga prapti*). *Acharya Vagbhatta* has mentioned the function of *Prana vayu* as "*buddhi hridaya indriya chitta dhrik*". *Vyana vayu* controls both somatic and autonomic functions of the body. *Sadhaka pitta* operates in association with *Prana vayu* and *Vyana vayu* to achieve a person's desire. This proves the basic theory of body's control system allow the functional system to operate in support of one another. All the mental functions are achieved by bio-chemicals secreted in brain. *Buddhi* is one of the functions of *sadhaka pitta*. *Buddhi* is developed as a complex process of *Chintya* (thought), *Vicharya* (consideration), *uhya* (hypothesis), *dheya* (attention) and *sankalpya* (determination). In modern science a thought results from a "pattern" of stimulation of the cerebral cortex, thalamus, limbic system, and upper reticular formation of the brain stem. All these functions are higher mental functions of brain. To achieve this neurotransmitter and neuropeptides are responsible and it does at molecular level. This represents the *sadhaka pitta*.

It helps in communication between neurons of brain, anatomical structures of the brain between midbrain, cortex and spinal cord and other parts of the body. As a result, *Shaurya*, *Harsha*, *Utsaha*, *Buddhi*, *Medha*, *Abhimana* occurs this is the function of *sadhaka pitta*. By the help of *Buddhi*, *Medha* and *Abhimana* all the motor functions are performed to achieve the person's desire.

Excess *kapha* and *tamo guna* in brain causes depression. They also inactivate higher center of brain and induce excessive sleep. This leads to slowing down all the activities. With this the intelligence of person fails and not able to achieve his aspirations and goals. *Sadhaka pitta* pacifies *kapha* and *tamo guna* and thus activates the brain. The activated brain enables one to achieve his dreams, goals, and aspirations. In the absence of *Sadhaka pitta* it would be impossible for anyone to achieve their aspirations. *Prakrita sadhaka pitta* enables a man to think better than his predecessors, aspire and have better goals. In psychiatric cases there is either increase or decrease in action of neurotransmitter and imbalanced production of *buddhi* and *smriti* occur. Either the patient is hyper excitable or depressed due to irregular secretions of neurotransmitter and neuropeptide. From the above discussion, we can conclude all the functions of neurotransmitters and neuropeptide are similar to the functions of *sadhaka pitta*. On the basis of functional understanding neurotransmitter and neuropeptides may be represented as *sadhaka pitta*.

## Inadequacies

Across all *Ayurvedic* textbooks, the following inadequacies are found in relation to *sadhaka pitta*.

- All the *acharya* have mentioned the site of *sadhaka pitta* is *hridaya* (Heart). Functions of *sadhaka pitta* are related to mind and all the psychological functions are regulated by neurotransmitters secreted in brain.
- On the basis of functions of *sadhaka pitta* it is more appropriate to conclude the location of *sadhaka pitta* in *Shira* in the place of *hridaya*.
- Role of *sadhaka pitta* is not mentioned in *Hridroga* and any type of *Manasa roga*.
- *Sadhaka pitta* plays an important role in production of *pandu* (anemia) disease. In modern literature anemia is not caused by any type of hormone/ neurotransmitter disturbance which are involved in production of *Shaurya*, *Harsha*, *Utsaha*, *Buddhi*, *Medha*, *Abhimana*.

## CONCLUSION

In this literary study we collected various data from the *Ayurvedic* classics with the available commentaries, as well as Textbooks of modern medical sciences, various articles for better understanding of the concept of *sadhaka pitta* and its comparison with contemporary science. *Ayurveda* is a science based on functional understandings. In general *pitta* is *drava* (liquid) in nature and involved in digestion, metabolism, biochemical reactions, chemical messengers at every level in the human body. *Sadhaka pitta* is situated in *hridaya*. In fact, functions of *sadhaka pitta* seem to be functions of central nervous system and it is associated with development of mental faculties and emotions. Neurotransmitter and neurohormonal substances like acetylcholine, dopamine, serotonin and norepinephrine are liquid in nature and helps in communication between different structures of CNS, may represent *sadhaka pitta*. From the above discussion functions of *sadhaka pitta* may be correlated with the functions of small molecules, rapidly acting transmitters and slowly acting neurotransmitters or neuropeptides. There is a need of further research to evaluate in detail of all other *doshas*. So,

those students of BAMS can understand easily the basic concepts of *doshas*.

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## Cite this article as:

Pritam Moharana and Rakesh Roushan. Sadhaka Pitta of Ayurved and its affiliates in Modern Perspective: A Review. Int. J. Res. Ayurveda Pharm. 2020;11(6):69-74 <http://dx.doi.org/10.7897/2277-4343.1106187>

Source of support: Nil, Conflict of interest: None Declared

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