

NEURO-ANATOMICAL AND PHYSIOLOGICAL STUDY ON SHADACHAKRA

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Abstract

Eastern philosophical traditions and Western nutrition related treatments both use chakras. The idea of chakras was formerly thought to be intended for spiritual activity such as kundalini sadhana. Numerous scientific studies on chakra have been published, covering topics with a strong connection to anatomy, physiology, and psychology. The body's energy centres, or chakras, are where the flow of cosmic energy enters the body. In the human body, there are seven chakras. It is connected to the body's primary nerve plexus anatomically, and endocrine glands are connected to it medically. There is evidence that chakras might produce electromagnetic radiation.

Keywords: Chakra, plexus, mooladhara, swadhisthana, manipura, anahata, vishudhi, ajna

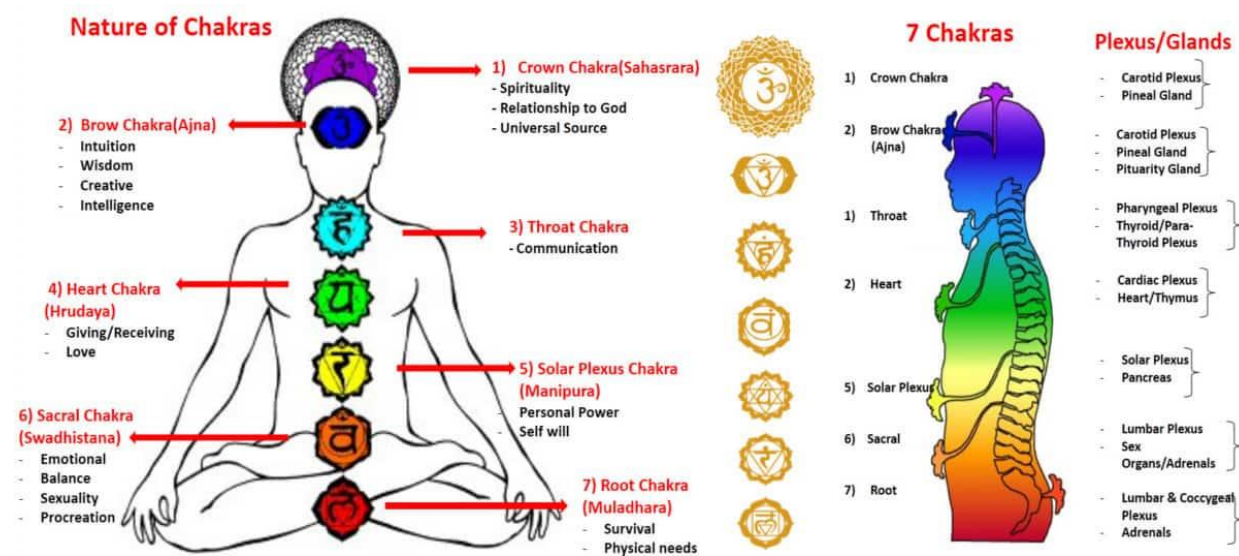
Introduction;

The word chakra literally means wheel or circle. [1] The original meaning of the word chakra as "wheel" refers to the chariot wheels of the rulers, called cakravartins. The concept of chakra arose in the early traditions of Hinduism, about 1000 years ago as part of Hindu and Buddhist tantric yoga traditions. [2,3] In Buddhism, especially in Theravada, the Pali noun cakka connotes "wheel". [4]. This system originated in India. In Jainism, the term chakra also means "wheel" and appears in various contexts in its ancient literature. [5]. Chakras were first introduced to the West by the Theosophical Society in 1880 (Leland, 2016). [6] A Western version of the chakra system was further developed by psychologists, philosophers and body workers during the Human Potential Movement in the 1960s and 70s. In the Western system, chakras provide a psychological map for self-development and a path of healing for self and others (Judith, 2004) [7]. Currently, chakras are a popular topic in New Age spirituality and healing, and biofield therapies (Gerber, 2000; Dale, 2009). [8,9]. Within Kundalini yoga, the techniques of breathing exercises, visualizations, mudras, bandhas, kriyas and mantras are focused on manipulating the flow of subtle energy through chakras. [10,11]. The chakras are part of esoteric medieval-era beliefs about physiology and psychic centres that emerged across Indian traditions [12,13]. The belief held that human life simultaneously exists in two parallel dimensions, one physical or sthula sarira and other psychological, emotional non physical" is called subtle body or sukshma sarira. [14]. This subtle body is energy, while the physical body is mass. The psychic or mind plane corresponds to and interacts with the body plane and the belief holds that the body and the mind mutually affect each other. [15]. The subtle body consists of nadi (energy channels) connected by nodes of psychic energy called chakra. [16]. No mention of Kundalini awakening and piercing of the seven chakras is found in Maharishi Patanjali's Patangal Yoga Sutra [17]. Anatomically, these Chakra may represent the nerve plexuses which is having different functions according to their area of supply. These plexuses are in the form of spokes around wheel [18]. Leadbeter (1927) noted that

the midline chakras are located close to major neurological plexuses, suggesting an association between the chakras and the nervous system[19](see Figure 1) .

Shadchakra: The six main Chakras located along are: Muladhara, Swadhisthana, Vishuddha and Ajna. Although acted in the subtle body, they correspond plexuses in the gross body. Beyond other centers of awakening: Bindu whose perception is acquired evolved states of consciousness. of the seven chakras located in the body [20].

Figure 1. Chakras and plexus analogy in vedic science



Anatomical Aspects of Chakra:

Mooladhara Chakra:

Anatomical Resemblance:

The triangular part in between the anus and genitalia is called the *Muladhara Chakra*. [21]

The *Chakra* is situated at the base of spinal column. It forms nerve plexuses around the *Sushumna* (spinal cord). This region of *Muladhara Chakra* represents the pelvic organs, i.e. rectum, uterus, bladder and testis. [22] Hence, regarding location of *Muladhara Chakra*, it may be mid-perineum area. [23]

Physiological resemblance:

The inferior hypogastric plexus constitutes the sacral division of parasympathetic system which directly controls the excretion of feces, urine, semen and fetus and the execution of sex act and reproduction. These are the reflex functions. These functions are executed through its four subdivisions which are uterine, vaginal, rectal and vesical. These same functions are confirmed as belonging to Muladhara Chakra. Deity of Muladhara Chakra is Dakini. On the basis of its characteristics defined in Upanishada it represent sensory impulses in our body traveled through neuronal plexuses which always carry the illumination of information. This proves that the deity Dakini represent sensory afferent centers of reflexes or actions. Thus, Dakini consists of those peripheral ganglionic cells which receive the sacral parasympathetic afferents from all four petals or sub-plexuses of Muladhara Chakra. [24]

Swadhsthana Chakra:

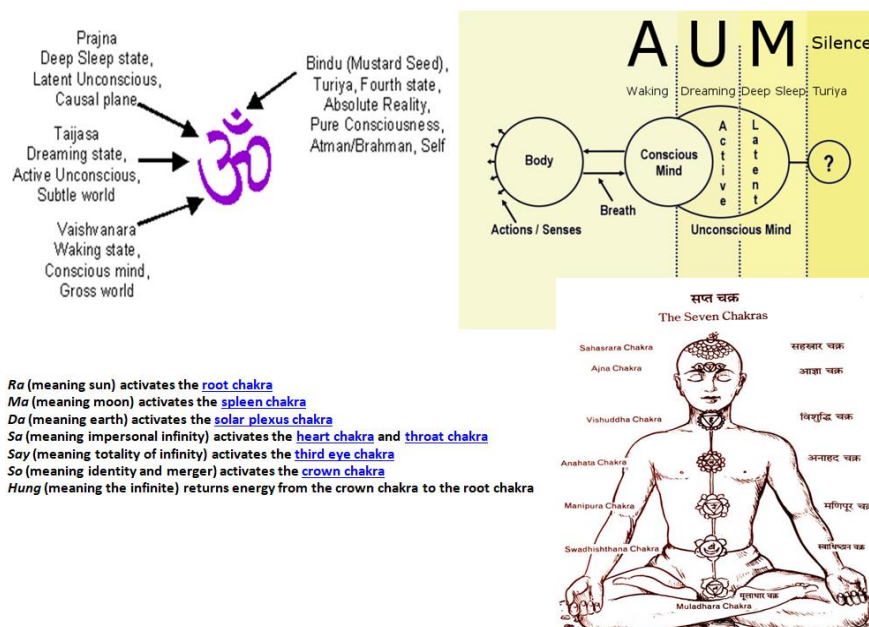
Anatomical Resemblance:

Thus, Gray's Anatomy (Williams et al., 1995) states, "... the inferior hypogastric (pelvic) plexus lies in the extraperitoneal connective tissue. In the male it is lateral to: the rectum, seminal vesicles, prostate and the posterior part of the urinary bladder ... lateral to it are the internal iliac vessels and their branches and tributaries, the levator ani, coccygeus and obturator internus. Posterior are the sacral and coccygeal plexuses and above are the superior vesical and obliterated umbilical arteries." [25] Continuous meditation with a proper aum chanting leads to open swadhsthana chakra and a state of peace (see Figure 2).

Physiological resemblance:

The ejaculatory ducts connect the inferior portion of the seminal vesicle and the ampullae of the vasa to the urethra. The ducts pass through the prostate gland, posterior to the median lobe. The ductal wall is a single layer of easily compressible endothelial cells with an approximately 1 mm diameter and 2 cm in length. These ducts terminate lateral to the prostate utricle on the verumontanum of the urethral ridge within the prostatic central zone. Ejaculation consists of two distinct phases: 1) emission, the release of semen into the posterior urethra from the ejaculatory ducts, and 2) expulsion, the forceful discharge of semen from the penis. These complex processes are mediated and orchestrated by the sympathetic and somatic nervous systems and are out of the scope of this review. [26,27] Emission relies on sympathetic nerves from the superior and inferior hypogastric plexuses that course through the prostatic plexus (within the primary radiation fields for PCa). Expulsion relies on a spinal reflex arc, Onuf's nucleus, and the perineal branch of the pudendal nerve (mostly outside the primary radiation fields for PCa). [28]. A patent urethra is necessary for the antegrade movement of seminal fluid.

Figure 2. Aum and Chakra interaction and other mantras: Ra, Ma, Da, Sa, Say, So, Hung



Manipur Chakra:

Anatomical Resemblance:

Coeliac or Solar plexus: The coeliac plexus is also known as the solar plexus bers. It is located at the back of the stomach or the upper abdomen where the coeliac trunk, renal arteries and the

superior mesenteric artery subdivide from the abdominal aorta. It is positioned behind the stomach and the omental bursa and before the crura of the diaphragm, the level of the first lumbar vertebra. The plexus is formed by the greater and lesser splanchnic nerves on both sides and [29] anterior and posterior vagal trunks. The sympathetic supply to the stomach is from coeliac plexus which branches from T6 to T9 via the greater splanchnic nerve. The sympathetic supply to the stomach follows the course of the gastric and gastro-omental arteries to reach the [30] stomach. The autonomous nervous system is in the form of sympathetic trunks which is situated on either side of Sushumna (spinal cord). It is made up of number of sympathetic ganglia. These ganglia give rise to lateral and medial branches. The lateral branches from these ganglia join the spinal nerves and supply to concerned viscera or part of the body. The medial branches of both sides join together along with other components if any and form plexuses. These plexuses are of autonomous nervous system so have no voluntary control over it. And here the role of Yoga starts to get control over these plexuses or to regularize their activities the Asana and Pranayama has great role.

Physiological Aspects:

The autonomic nervous system (ANS) controls the activity of the stomach through parasympathetic stimulation which increases muscle tone and peristalsis relaxes the sphincter thereby open it increases acid and pepsin production. Sympathetic stimulation which decreases muscle tone and peristalsis constricts the sphincter thereby closing it inhibits acid and pepsin secretion. [31] Myenteric plexus which lies between the muscular layers of the gut is a part of coeliac plexus. Its main role is in coordinating the movement of food through gut. Sub mucosal plexus lies in the sub mucosa that is under the inner mucosal lining of the gut. Its main roles is controlling gastrointestinal secretions, like the gastric acid secretion in the stomach and controlling blood flow in the gut wall which is important for the absorption of nutrients.

Anahata Chakra;

Anatomical Resemblance:

The deep cardiac plexus lies in front of the tracheal bifurcation behind the aortic arch and is formed by cardiac nerves arising from the cervical ganglia of the sympathetic trunk and cardiac branches off the vagus and recurrent laryngeal nerves. Thus, this plexus tends to have both left and right sided input. Essentially, the deep cardiac plexus receives all neuronal input not contained within the superficial plexus. The deep plexus then divides into a right and a left half. Branches from the right half run both anterior and posterior to the right pulmonary artery and form most of the anterior coronary plexus, with some fibers also going to the right atrium and posterior coronary plexus. The left half, in turn, connects back with the superficial cardiac plexus and gives branches to the left atrium and portions of the anterior pulmonary plexus, but generally forms most of the posterior coronary plexus [32]

Physiological resemblance:

The functional distribution of atrial ganglia has generally been done by dividing their preferential input to the sinoatrial versus atrioventricular nodes, with the sinoatrial ganglia mainly consisting of those inferior and posterior to the sinoatrial node, extending from the right pulmonary veins to the sulcus terminalis, and the atrioventricular ganglia mainly consisting of those in and near the interatrial groove and at the coronary sulcus junction. However, there is crosslinking between ganglia such that ganglia that preferentially affect the sinus node may also have innervation to the atrioventricular node, and vice versa. This cross-modulation from unidirectional and bidirectional feedback makes study difficult due to the multiple levels of complexity [33].

Visuddhi Chakra:

Anatomical Resemblance:

It is represented by cervical plexus or brachial plexus. It is originating from the ventral branches of the last 4 cervical and 1st thoracic spinal nerve supplying structures in the neck region. The chakra is situated precisely where that little indentation is in the throat, the organ of voice, the air passage between the lower pharynx and the trachea formed by cartilage thyroid, coracoid, epiglottis, paired arytenoids corniculate and cuneiform.[26]

Physiological resemblance:

The function of the cervical plexus is to provide skeletal muscle control of the neck and upper torso as well as providing cutaneous sensation to parts of the occiput, neck, and shoulder.

Ajna Chakra:

Anatomical Resemblance:

Ajna Chakra: It is believed by some to be a dormant organ that can be awakened to enable telepathic communication. Ajna Chakra "is located between the eyebrows also called third eye chakra. In physical body there are two eyes which view objects upside down and send image and makes it appear right side up to us but in human body was another physical eye i.e. third eye or spiritual eye which is correlated with the pineal gland. Ajna Chakra is best balance through meditation and Pra-nayama or Bramhari technique.[22]

Physiological resemblance:

Ajna Chakra is often called as "center of command" or chief commanding or regulating center on the basis of its applied physiological aspects. The Hypothalamus (representing the circle of Ajna Chakra) with the help of its all associated nuclei is performing a function of a leader or can act as a ruling personality over most of the physiological activity of body and mind. Meeting point of three Nadis (Ida, Pingala and Sushumna) forms a triangular circle called as Triveni of Sangama, from where the information may communicate (receive and relay) with the other parts of body and mind. This Triveni point represents the thalamus also known chief relay station.13 Supra chiasmatic nucleoli and paraventricular nucleus with the supraoptic nucleus of hypothalamus regulates the functions of the pineal and pituitary endocrine glands which act like two petals with Beejakshar Ham and Ksham respectively. Preoptic region of hypothalamus participates in regulating the autonomic activities. Through this hypothalamus controls and integrates balancing activity of sympathetic and parasympathetic nervous system, represents the power of Lord Hakini Shakti.[34]

Summary:

Chakra system is a path for inner revolution, and it is to drop all the religious beliefs, constraints, prejudices and create the space within that to conceive the infinite and timeless truth Earlier studies have already given the philosophical, psychological detailed description of *Sada Chakra*, but the above study reveals some scientific explanation like anatomical and physiological aspects of *sada Chakra*. Anatomical related to chakra exists in the dorsal CNS. One dimension of chakra is the spiritual while others are physical and physiological existence. is their spiritual while other is physical existence. The literature has described the Chakras as metaphysical equivalent of the endocrine glands, as noticeable similarity between the positions of the two has been observed [35] .. Sturgess also linked the lower six chakras to specific nerve plexuses along the spinal cord as well as with the glands [36]. Likewise, the Ajna Chakra is linked with the pineal gland which is a part of the endocrine system [37, 38].

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