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Review on *Shadanga Sharira*

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ABSTRACT

The study of human body can be done in various ways like system wise study of organs macroscopically and microscopically, as per location of organs, in relation with other organs or the study of body parts inside to outwards and vice versa all together leading to a sum of knowledge. Though the study becomes more interesting as we go in depth. *Shadanga Sharira*, the human body divided into 6 parts namely four limbs, Head (head and neck) and trunk regionally. These *Shadangas* are individually called *Anga*. The *Angas* further divided into smaller units are *Pratyanga*. "The different parts or members of the body as mentioned before including the skin cannot be correctly described by one who is not well versed in anatomy. Hence, any one desirous of acquiring a thorough knowledge of anatomy should prepare a dead body and carefully, observe, by dissecting it, and examine its different parts." *Sushruta Samhita* provide important surgical and anatomical information of the human body under the description of diseases, surgical procedures and all which are of at most important while dealing with patient. Here we review the *Shadanga Sharira* in modern anatomy.

Key words: *Shadangas, Angas, Pratyangas.*

INTRODUCTION

Human body is composition of complicated structure functioning together. In Ayurvedic classics human anatomy was revealed by both inspection of the surface and through dissection. *Shadanga* and *Pratyang* are first ever explained anatomical landmarks the medical science. The Ayurvedic sages, first of all described the regional anatomy as concept of *Shadangatwa* elaborated with constituent structural anatomy later the *Pratyangas*, to make the study easy. But the availability of the references

scattered and the explanation is not exactly similar to the anatomy we study today; an attempt is made to prove the importance of the study of *Shadanga* to make the learning of anatomy easy.

AIMS AND OBJECTIVES

To study the importance of *Shadanga Sharira* in the learning of anatomy.

MATERIALS AND METHODS

Sushruta Samhita and its commentaries other contemporary Human Anatomy books.

REVIEW

Shadanga Sharira is the division of body into six regions is called *Shadangas*. They can be termed as *Anga* also. This study can be co-related with the regional anatomy in these days. *Sushrutacharya* divided whole human body into 6 parts mainly, they are: (1). Four - *Shakhas* which involve two- *Urdva Shakha* (right and left upper limb) and two *Adah Shakha* (right and left lower limb).(2). *Madhyamam* - one, which means *Madhya Sharira*. *Sushruta* termed thorax and abdomen together as *Madhayam*. (3) *Shira*

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- one in number which involves all the structures above clavicle i.e., head and neck, though neck is not mentioned particularly explained under the title of *Shira*.^[1]

This classification is regionally but can also be noted that as functional division too as the *Shakha*, *Madhyam* and *Shira* deals mainly with the functions of locomotory (movement of things or body), maintenance (maintains all body functions required for the normal body to perform) and controlling (which regulates all the voluntary as well as involuntary functions of body) respectively.

Formation and development of Shadanga

Since from the formation of unicellular zygote to all the presenting parts has been explained in a unique pattern. First of all, the embryo is formed into jelly like cell mass then undergoes compactness then the formation of buds takes place in third month of pregnancy, one for head and four for upper and lower limbs. The *Shadanaga* and *Pratyanga* also start forming in fourth month.^[2] In fifth month mind is more awakened. The intellect evolves in sixth month. By seventh month of pregnancy, the foetal body is completely formed and the growth is completed till ninth month of pregnancy normally.^[3]

Table 1: Division of body structures according to Sushruta.

SN	Structure	Shakha	Madhayam	Shira
1.	<i>Asthi</i> ^[4]	120	117	63
2.	<i>Sandhi</i> ^[5]	68	59	83
3.	<i>Peshi</i> ^[6]	400	66 (+ 20 In Females)	34
4.	<i>Asthi Sanghata</i> ^[7]	12	1	1
5.	<i>Seevani</i> ^[7]	-	1	5
6.	<i>Seemanta</i> ^[7]	12	1	5
7.	<i>Jala</i> ^[7]	8	-	-

8.	<i>Rajju</i> ^[7]	-	4	-
9.	<i>Koorcha</i> ^[9]	4	1	1
10.	<i>Khandaraa</i> ^[10]	8	4	4
11.	<i>Snayu</i> ^[11]	600	230	70

Pratyanga

Pratyanga can be defined as structure located in relation to or in *Anga*. *Sushruta* called it as a division, section or parts of any main part. *Upanga* are minor parts that co-ordinate with *Pratyanga*. *Sushruta* in *Sharira Sthana* chapter - 5, classified *Pratyanga* into *Bahya Pratyanga* and *Abhyantara Pratyanga*.

Bahya Pratyanga are available externally, visible and forming surface marking on the body. *Abhyantara Pratyanga* are located inside body, also called *Abhantara Avayava*.

Table 2: Bahya Pratyanga according to Sushruta.^[12]

SN	Name of Pratyanga	Number
1.	<i>Mastaka</i> (Head)	01
2.	<i>Udara</i> (Abdomen)	01
3.	<i>Prishta</i> (back)	01
4.	<i>Nabhi</i> (Umbilicus)	01
5.	<i>Lalata</i> (Forehead)	01
6.	<i>Nasa</i> (Nose)	01
7.	<i>Chibuka</i> (Chin)	01
8.	<i>Vasti</i> (Urinary bladder)	01
9.	<i>Greeva</i> (Neck)	02
10.	<i>Karna</i> (Earpinna)	02
11.	<i>Netra</i> (Eyes)	02
12.	<i>Bhru</i> (Eye brows)	02
13.	<i>Shankha</i> (Temples)	02

14.	<i>Amsa</i> (Scapula)	02
15.	<i>Ganda sthana</i> (maxillary projections)	02
16.	<i>Kaksha</i> (axilla)	02
17.	<i>Stana</i> (breasts)	02
18.	<i>Vrushana</i> (testes)	02
19.	<i>Parshwa</i> (flanks)	02
20.	<i>Sphik</i> (buttocks)	02
21.	<i>Janu</i> (knee joints)	02
22.	<i>Kurpara</i> (elbow joints)	02
23.	<i>Bahu</i> (arms, forearms, upper limbs)	02
24.	<i>Uru</i> (thighs, legs, lower limbs)	02
25.	<i>Anguli</i> (fingers)	20
26.	<i>Akshi Kuta</i> (orbits)	02

Table 3: Abhyantara Pratyangas / Avayavas according to Sushruta.^[13]

SN	Abhyantara Pratyanga	Number
1.	<i>Twacha</i> (Skin)	07
2.	<i>Kala</i> (Membranes)	07
3.	<i>Ashaya</i> (Cavities)	07
4.	<i>Dhatus</i> (Tissues)	07
5.	<i>Sira</i> (Veins)	700
6.	<i>Peshi</i> (Muscles)	500
7.	<i>Snayu</i> (Ligaments)	900
8.	<i>Asthi</i> (Bones)	300
9.	<i>Sandhi</i> (Joints)	210
10.	<i>Marma</i> (Vital points)	107

11.	<i>Dhamanees</i> (Arteries)	24
12.	<i>Dosha</i>	03
13.	<i>Mala</i> (Excreta)	03
14.	<i>Srotas</i> (External apertures)	09
15.	<i>Kandaraa</i> (Tendons)	16
16.	<i>Jala</i> (Mesh networks)	8
17.	<i>Kurcha</i> (Aponeurosis)	6
18.	<i>Rajju</i> (Rope like cords)	4
19.	<i>Sivani</i> (Sutures)	7
20.	<i>Sanghata</i> (Large bony junctions)	14
21.	<i>Seemanta</i> (Bony ends)	18
22.	<i>Yogavahisrotas</i> (channels of circulation)	22 (11 pairs)
23.	<i>Antra</i> (Intestines)	02
24.	<i>Yakrit</i> (Liver)	01
25.	<i>Pleeha</i> (Spleen)	01
26.	<i>Phuphusa</i> (Lungs)	2
27.	<i>Unduka</i> (Caecum)	1
28.	<i>Hridaya</i> (Heart)	1
29.	<i>Amashaya</i> (Stomach)	1
30.	<i>Vrikka</i> (Kidneys)	02

DISCUSSION

Anatomy is studying the structure of body parts and their relationships to one another. Gross anatomy is subdivided into surface anatomy (the external body), regional anatomy (specific regions of the body), and systemic anatomy (specific organ systems).

Regional anatomy focuses on specific external and internal regions of the body and their function

together in that region. Regional anatomy is when all the structures (muscles, bones, blood vessels, nerves, etc.) in a particular region of the body, such as the abdomen or leg, are examined at the same time.

Regional anatomy is widely used in modern teaching because it is easier to apply to a clinical setting. The major anatomy textbook, Gray's Anatomy, has recently been reorganized from a systems format to a regional format to reflect this preference. Surface anatomy is also widely used to gauge the position and structure of deeper organs, tissues, and systems.

For the study of medical science in these days the study human body is also divided in Head, Neck, Trunk and Limbs.

Upper Limb has the shoulder, the arm/brachium, the forearm/antebrachium, and the hand, fingers on each side proximal to distal. Shoulder region includes axilla, the scapular region and pectoral region. The arm is the part of the upper limb between the shoulder and the elbow. The forearm extends from the elbow to the wrist and finger.^[14] *Urdwashakha* extends till *Angulis*.

Lower Limb has the hip, the thigh, the leg, and the foot and toes from above below. The hip overlies back of the pelvis, extending from waist to the groove the condyles which articulate with the femur. The thigh extends from hip to knee, the proximal extent of the thigh is the gluteal fold posteriorly, the groove of the groin (inguinal region) anteriorly, the perineum medially, and the surface depression on the side of the hip laterally. The depression on the back of the knee is the popliteal fossa. The leg extends from the knee joint to the ankle joint. The soft, fleshy part of the back of the leg is the calf. The foot extends from the point of the heel to the tips of the toes.^[15] *Adahshakha* also ends in *Angulis*, in classics both the toes and the fingers are termed as *Anguli*.

The trunk is subdivided in *Uras* (Thorax) and *Udar* (Abdomen). To acquire first-hand knowledge of position of various structures in body and have elementary knowledge of various structures to be encountered, one has to study by dissecting cadaver region by region. Next, the structures we meet from

outside to inside are Skin consisting of Superficial Layer: blood and lymphatic vessels and nerves. Deep Fascia has muscle septa which envelops the muscles, the vessels and the nerves lying between. This explanation of muscle septa given is same as the definition of *Mamsadhara Kala* explained in Ayurvedic classics. Intermuscular Septa, well develop, are frequently thickened tunnels form Retinacula (modified connective tissue) that hold tendon in position and are stretched by tendons. The study of *Kandaraas* can be closely related with the fasciae or tendons, but the term "*Kandara*" has been presented with different opinions. These fasciae react with collagen fibres form aponeuroses and ligaments, thickened to form Aponeuroses (*Koorcha*) can be identified by its glistening appearance and the muscles are attached to it. Ligaments inelastic, strong, white bands, their margins are usually less defined since they are thickened in the mass of fascia. These have been described in 4 types depending on structure, namely *Pratanvathi Snayu* (branched), *Vrutha Snayu* (circular), *Sushira Snayu* (porous) and *Pruthu Snayu* (flat). Muscles form nearly half of the body weight composed of bundle of muscle fibres held together by fibrous tissue within which the particular slides. This is directly compared with *Mamsa Dhatu*, one of the *Sapta Dhatus*. Its types based on shape and size mentioned by *Sushrutacharya*: *Bahala*, *Pelava*, *Anu*, *Sthoola*, *Pruthu*, *Vrutta*, *Hrusva*, *Deergha*, *Sthira*, *Mrudhu*, *Shlakshna* and *Karkasha*. Joints are present between two or more bones, explained vastly in *Sushruta Samhita* in *Sharira Sthana* and *Chikitsa*. Most deep in body lies the Bones, which form the frame for the soft tissue. The structure and types are explained by *Sushrut* are: *Kapala* (flat), *Ruchaka* (teeth), *Taruna* (cartilage), *Valaya* (irregular) and *Nalak* (long).

Superiorly the Trunk is continuous with the neck. The upper limbs are attached to the upper part of the torso, and muscles of the upper limb. The lower limbs articulate with the bony pelvis and posteriorly overlap with abdominal and pelvic organs. Most critical organs are placed within the trunk.^[16] In the thorax are the heart and lungs, protected by the rib cage. As its

clearly mentioned *Vaksha* (thorax) is the region where *Hridaya* (heart), *Phuphusa* (lungs), *Sthana* (breast) are located. Most of the gastrointestinal tract and the *Yakrit* (liver), *Pleeha* (spleen), *Pittashaya* (pancreas), and *Vrikka* (kidneys) are located in the abdomen i.e. *Udara*. Finally, the *Udar-Kati Guha* (pelvis) contains the male and female reproductive organs, the urinary bladder, and the terminal part of the gastrointestinal tract are placed deep inside trunk. The posterior aspect of the trunk includes the vertebral column, the deep muscles of the back, and the thoraco-lumbar fascia is termed *Prushta* in classics.

In *Shirogriva* (head and neck) the skeleton of the head is the skull. It is formed by a number of separate bones, almost all of which meet each other at linear fibrous joints, filled with dense fibrous tissue in early life. Bony fusion across the fibrous tissue begins after 30 years of age. The mandible articulates with the skull at a synovial joint – the *Hanusandhi* (temporomandibular joint) - the only *Cheshtavant* (movable) joint in the skull. The skull without the mandible is the cranium. For descriptive purposes, the cranium is divided into the neurocranium and viscerocranium.^{[17],[18]}

Auricle, the *Bahya Karna* (external ear) lies nearer the back of the head than the front and is at the level of the eye and nose, mentioned by Dr. Rachel can be said as the starting point of *Karna* which is *Bahirmukha Srotas*.

Back and side of the head, where the *Bahi Pascha Kapal Utsedha* (external occipital protuberance) is the midline bony elevation felt where the back of the head joins the neck. From this protuberance, an indistinct, curved ridge - the superior nuchal line - extends laterally on each side between the scalp and the neck.

Face has external nose has mobile anterior part of consists of skin and cartilage. The rigid upper part - the bridge of the nose - is formed by the two *Nasasthi* (nasal bones) and the two *Agra Pravardha* (frontal processes) of the *Urdhva Hanuasthi* (maxillae). The part of the nasal cavity immediately above each nostril is the vestibule of the nose. The vestibule is

lined by hairy skin. The auricle expanded to form the ala of the nose. All these are explained in the *Asthishareera*, *Nasarogas*, and *Nasyakarma* and most importantly in rhinoplasty procedure.

Danta (Teeth) is a full set of adult teeth consists of 32 teeth, 8 in each half of the jaw. From before backwards, these are: two incisors, one canine, two premolars, and three molars. There are 20 teeth in the primary dentition, i.e. five in each half of the jaw: two incisors, one canine, and two molars, also called 'milk' molars, which is somewhat similar to the explanation of *Danta* in *Sankhya Sharira*.

Zygomatic arch which extends over the interval between the ear and the eye. The narrow posterior part is formed by the zygomatic process of the temporal bone, and the anterior part by the *Gandasthi* (zygomatic bone). *Akshiguha* (Orbit), the bony structure has orbital margins: (1) the *Adhiakshiya Bhagiya* (supra-orbital notch) on the highest point of the superior margin, about 2.5 cm from the midline; and (2) the fronto-zygomatic suture at the supero-lateral.

Bhru (Eyebrow) is the hairy skin above the *Adhiakshiya Dhara* (supra-orbital margin). Over its medial end is a curved ridge of bone that is the *Rekhiya Chap* (supraciliary arch) and is separated from its fellow on the other side by a smooth median area called the glabella.

Netra (Eye) has the *Shweta Patala* (sclera) and the transparent part of the front of the eye is the *Swacha Mandal* (cornea). The coloured *Krishna* (iris) (usually black or dark brown) is seen through the cornea and has a dark, circular central aperture - the pupil. The visible part of the sclera is covered with a moist, transparent membrane called *Netra Shleshmal Kala* (conjunctiva). The conjunctiva passes from the sclera on to the deep surface of the eyelids. The reflection of the conjunctiva on to the eyelids is the fornix, and the entire conjunctiva encloses the conjunctival sac. The sac opens anteriorly between the eyelids through the palpebral fissure.

The *Netra Chaada* (eyelids/palpebrae) are folds which protect the front of the eye. The upper lid is larger

and more mobile than the lower. At the medial angle of the eye is a small, triangular area known as the lacus lacrimalis, with a reddish elevation - the lacrimal caruncle- near its centre. The lacus carries a few fine hairs. Just lateral to the lacus is a small, vertical fold of conjunctiva-the plica semilunaris.

Pakshma (Eyelashes/cilia) project from the anterior edge of the free margin of the eyelid. The free margin of the lids is rounded medially and has a small elevation – the *Ashru Patah* (lacrimal papilla). Each papilla is surmounted by a tiny aperture – the *Ashru- Putak* (lacrimal punctum). The puncta lead into the lacrimal canaliculus which drains the lacrimal fluid from the conjunctival sac.

CONCLUSION

Ayurvedic anatomy is basically clinical/functional anatomy, so the anatomical aspects are described where ever required with the description of cause of disease or treatment of disease. Though *Sharira Sthana* is the core of anatomical knowledge but chapters on basis of regional anatomy are limited. The knowledge of anatomical structure is the base to understand functions, pathological changes. It has its own importance while performing surgeries as well as post-surgery. So, it is needful to learn the anatomy with comparison. Ironically, knowledge of anatomy is increasingly important but there is major shortage of academic workout in one or the other way.

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