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A REVIEW STUDY ON THE CONCEPTS OF HUMAN ANATOMY IN AYURVEDA

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ABSTRACT

Āyurveda has described in detail the dissection methodology, nomenclature of human anatomy and clinical anatomy as well. Āyurveda provide the evidence of existence of knowledge of anatomy before the announcement of modern anatomy. Till date, very little is known to the western world about the profound description of the subject present in ancient texts of Indian medicine. The present research work is taken to show eternity of our ancient science.

This is a glimpse of history of anatomy according to Grays Anatomy - the anatomical basis of medicine and surgery. But in fact the ancient system of Indian medicine Āyurveda has described in detail the dissection methodology, nomenclature of human anatomy and clinical anatomy as well. Various Vedic texts, other classical literature of Indian civilization and Āyurveda provide the evidence of existence of knowledge of anatomy before the announcement of modern anatomy. Till date, very little is known to the western world about the profound description of the subject present in ancient texts of Indian medicine. The roots of the modern anatomy lie in history of Indian civilization. The present research work is taken to show eternity of our ancient science.

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INTRODUCTION

Anatomy is broadly appreciated as being one of the cornerstones of medical education. Learning anatomy through the dissected cadaver is viewed as the uniquely defining feature of medical courses. Explosion of knowledge in the field of medicine was feasible only due to exploration of human body through human cadaver dissection. If we go through the history of human anatomy it seems that anatomy of modern times is well recognized from the days of renaissance that is from 15th century. The foundation stone of modern anatomy is the work of Andreas Vesalius: *De Fabrica Corporis Humani*, published in 1543. Earlier to this period the knowledge of anatomy was used mainly for painting i.e. to maintain body part ratio; hunting i.e. even in prehistoric period, the human races were aware about the anatomy of various animals for ease of hunting. Important body organs like heart and lungs were targeted by spear or arrow for sudden death of that animal. *Ācārya Caraka* studied the anatomy of the human body and various organs. He gave 360 as the total number of bones, including teeth, present in the human body. He also described the numbers of muscles, joints etc. in the Human body. He considered heart to be a controlling centre. He explained that the heart is connected to the entire body through 10 main channels. He also claimed that any

obstruction in the main channels led to a disease or deformity in the body. He also described about the concept of body cavity.

Aims and objectives

To explore and analyze the text books of *Āyurveda* to find the Concept of Human Anatomy in Ayurveda and its relevance in present modern era.

MATERIALS AND METHODS

References related to proposed title are collected from classical texts of *Āyurveda* especially *Brihatrayī Samhita*. Various publications, internet, books related to the history of modern Anatomy, research papers and proceedings of seminars related to the topic are collected and their critical analysis and evaluation is done. Relevant ideas from allied sources on the subject are also supplemented. Humble and honest efforts are made to find some clear concept in anatomy.

Concept of Human Anatomy in Ayurveda

Suśruta is considered as the father of surgery even today, but if we go through the *Āyurveda* text, essentials of human anatomy are very precisely described by *Suśruta*, so *Suśruta* should also be considered as the father of human anatomy. *Ācārya*

Suśruta has paid great attention towards the structural organization of the human body. This was emphasized to such an extent that no surgeon should start his surgical career unless he is well aware with human anatomy. *Ācārya Suśruta* has not only mentioned the anatomical locations of various body structures but also given the detailed description right from development of various organs, intrauterine life of foetus, month wise development of foetus, nutrition of foetus, maternal health etc. He has so keenly mentioned that the sperm and ovum combines together to form embryo in the *Garbhāśaya* (Uterus). *Suśruta* has separately explained the anatomical aspects of the body and one section of the *Suśruta samhītā* has been devoted exclusively for this, which is known as the *Śārīr sthāna* (section related to the study of human body).

Ācārya Suśruta planned to first deal with *Sṛiṣṭi utpattī kram*, Embryology (*Garbhāvākṛānti Śārīr*) and then anatomy of the human body. He also stressed on the importance of observational and practical experience in surgery. For this he mentioned a separate chapter named '*Yogyā sūtrīya*' in *Sūtra sthāna*. He may be the first person to advocate dissection to gain the first hand knowledge of the human anatomy. *Suśruta* was a strong supporter of human dissection as evident from his texts. His texts include a systematic method for the dissection of the human cadaver. They were mastered from extensive human dissection which they skilled despite religious interference. He considered that aspiring surgeons must first be an anatomist for skilful and successful practice. The physician or surgeon desiring to have the exact knowledge of *Śalya śāstra* should thoroughly examine all parts of dead body after its proper preservation. Practical knowledge along with theoretical knowledge is very essential for any practitioner. Thus the knowledge of Anatomy is necessary for doing successful practice. In this context some basic concepts are collected to show that scientific knowledge of human anatomy was very well known to ancient seers. These are following-

Human body dissection – Selection of cadaver, preservation and method of dissection

The concern of using humans for dissection was in conflict to the religious law of the time; however, it was an essential tool for the true understanding of human anatomy. *Suśruta* described the details of human dissection. For dissecting purpose, a cadaver should be selected which has all the body parts present, who had not died due to poisoning or chronic disease, had not attained hundred years of age. Such cadaver should be taken after removing fecal matter from his/her intestines. Whole body should be wrapped by any one of *Muñja*, bark, *Kuśa* and flax etc. and kept inside a cage placed in a slowly flowing river to decompose. Before selecting the river for this process it must be remembered that the place should be secluded and the water of that river is not consumed for drinking and other household purpose. After proper decomposition for about seven nights the cadaver should be removed from the cage and then dissected layer by layer by scraping with the brushes made by any one of *Uśīra*, *Bāla* (hair), *Venu* (bamboo) and *Valkala*.

In this way after removing skin all the external and internal parts with their sub-divisions should be visually examined at maximum. After description of dissection technique, *Ācārya Suśruta* mentioned the importance of dissection. Therefore the person, who wishes to learn surgery, should keenly study the various body organs of the cadaver. In brief, theoretical as

well as practical knowledge of dissection is very useful for enhancing the working skills of a surgeon. *Suśruta* was the first person who resorted to human dissection to understand the structures of the body in detail. So we see that the basics for cadaveric preservation are still the same for the purpose of dissection. By the unique method of scraping the body layer by layer he was able to remove the superficial fascia without damaging the soft structures & to note the features of various body parts and describe them accurately.

Ṣaḍaṅga Śārīr (Concept of regional anatomy)

Ācārya Caraka, *Suśruta* and *Vāgbhatta* all the three *Ācārya* divided the whole body into six regions. There are various ways by which the study of anatomy can be done. For study purpose, anatomy can be divided into two following subtypes- macroscopic or gross anatomy and microscopic anatomy. Regional anatomy is one of the important branches of macroscopic anatomy. Similar to *Āyurveda*, in modern science the regional anatomy considers the organization of the body as major parts or segments: a main body consisting of the head, neck and trunk (subdivided into thorax, abdomen, back and pelvis/perineum) and paired upper limbs and lower limbs.

Regional anatomy is the method of studying the body's structure by focusing on a specific part, area or region; examining the arrangement and relationships of the various systemic structures (muscles, nerves, arteries) within it; and then usually continuing to study adjacent regions in an ordered sequence. Regional anatomy also recognizes the body's organization by layers: skin, subcutaneous tissue and deep fascia covering the deeper structures like muscles, skeleton and cavities which contain viscera. In this way we can say that the concept of regional anatomy was known that time also.

Asthī Śārīr (Concept of Osteology)

Suśruta has described the importance of *Asthī* that how these are the major supporting framework of our body and he also mentioned their types with their examples. *Caraka* had not given detailed description of *Asthī* (bone). He only mentioned the total numbers of *Asthī* in human body but *Suśruta* had explained in detail. He considered the *Asthī* as the framework of body which helps in maintaining proper posture, shape and skilled movements. *Ācārya Suśruta* also described that *Asthī* is the solid parts of the body. *Suśruta* classified the bones on the basis of their structure or shape as- flat bones, small cubical bones, cartilages, curved bones and tubular bones. Classification of this accuracy shows he was a keen observer. Enumeration i.e. *Sankhyā* of human parts is as important as the knowledge of particular organ as stated by *Ācārya Caraka*. According to *Cakrapāṇi*- the knowledge of enumerate the *Avayava* of human body is important in clinical practice.

According to modern anatomy, there are about 206 bones in the adult human skeleton. The early Indian anatomist, on the other hand, count either 360 (*Ātreya*) or 300 (*Suśruta*) bones. This vast difference is principally due to the facts that (besides including the teeth, nails and cartilages) they counted prominent parts of bones, such are now known as 'processes' or 'protuberances'. This difference may be due to the basis of counting bones in modern and ancient science. Modern science includes only that structures as bones which contains Haversian system while in ancient times the basis may be the hardness of the body part and they also counted that structures which decay very late after death

Sandhi Śārīr (Concept of syndesmology)

These *Sandhis* are of eight varieties: *Kora*, *ulūkhala*, *sāmudga*, *pratara*, *tunnasevanī*, *vāyasatuṇḍa*, *maṇḍala* and *Śāṅkhāvarta*. Out of these the *Kora sandhi* is found in the fingers, wrist, ankle, knee and elbow; the *Ulūkhala sandhi* is found in the axillae, hips and teeth roots; the *Sāmudga sandhi* is found in the scapulae, anal regions, pelvis and buttocks; the *Pratara sandhi* is found in the neck and back; *Tunnasevanī* are found in the flat bones of the hip and cranium; *Vāyasatuṇḍa* are found on the both sides of the mandible; the *Maṇḍala* are found in the *Nāḍī* of the throat, heart, eyes and *Kloma*; and *Śāṅkhāvarta* are found in the ears and *Śrīṅgātaka*. In *Āyurveda*, *sandhi* is classified into two types- *Chala* (movable) and *Acala* (immovable). These movable joints further may be divided into two subtypes- (1) *Alpa cala* (slightly movable) - like *Pratara*, *sāmudga sandhi*. (2) *Bahu cala* (Freely movable) - like *Kora*, *ulūkhala sandhi*. This classification resemble similar to modern classification of joints like Synarthrosis (an immovable joint), Amphiarthrosis (a slightly movable joint) and Disarthrosis (a freely movable joint). In this way we can say that the concept of syndesmology was known that time also.

Description of Peśī (Myology)

Ācārya Suśruta has described the definition, types, and numbers about the *Peśī* in *Śārīr sthāna*. *Peśī* are thick or thin, big or minute, stout/thick or round/circular, short or long, fix/stable, hard or soft, smooth or rough; they cover the *Sandhi*, *asthi*, *sirā* and *Snāyu*, in their places naturally. As the *Peśī* entrap *Sirā*, *snāyu*, *asthi* and *Sandhi* hence they attain strength.

Description of Snāyu (Ligament)

As a boat prepared by joining firmly many wooden planks is able to bear the weight of persons in the water, similarly all the *Sandhi* of the body bound by many *Snāyu* are able to sustain body weight. Injury to *Asthi*, *peśī*, *sirā* and *Sandhi* does not cause as much disability as an injury to the *Snāyu*. One, who understands well all the superficial and deep *Snāyu*, is able to extract the deeply penetrated foreign body.

Garbha Śārīr (Concept of developmental Embryology)

According to *Ayurveda* union of *Śukra* (sperm), *Śonita* (ovum) and *Ātma*, implanted in the uterus is designated as *Garbha* (foetus). The zygote embedded in the uterus combined together with *Ātma*, *prakṛti* and *Vikāra* is called foetus. According to *Suśruta* *Garbha* lies in the uterus of women, in universal flexion and face forward; at the time of delivery the head of the foetus naturally comes towards *Yoni* (According to Prof. K. R. Srikantha Murthy). Foetus lies in woman's uterus in state of universal flexion facing towards mother's back; at the time of delivery, its head naturally comes towards *Yoni* (According to P. V. Sharma). The *Nābhināḍī* is attached to the *Rasvahā nāḍī* of the mother and this carries *Āhārarasa-vīrya* (nutrition) from the mother to foetus. The foetus grows by this indirect supply of nutrition. From the time of conception until the different parts of the body and their sub divisions will manifest, foetus gets nutrition from the obliquely running *Rasvahā dhamanī* which course through all parts of body and imparts life of the foetus. The course of *Nābhināḍī* is that it is attached with *Garbha nābhi* in one end and other end attached with *Aparā* (placenta) and in turn *Aparā* is annexed with *Mātrhrdaya*.

Koṣṭha and Koṣṭhāṅga (Concept regarding body cavities)

The body contains *Āmāsaya*, *agnyāsaya*, *pakvāsaya*, *mūtrāsaya*, *uṇḍuka* (caecum) and *Raktāsaya*, as well as the *Hṛdaya* (heart) and the *Phuphphusa* (lungs) are known as *Koṣṭha* and organs present in the *Koṣṭha* are called as *Koṣṭhāṅga* (viscera in the thorax and abdomen) which are 15 in number. They are *Nābhi* (umbilicus), *Hṛdaya* (heart), *Kloma*, *Yakṛt* (liver), *Plīhā* (spleen), *Vṛkkau* (kidneys), *Basti* (urinary bladder), *Puriṣādhār* (pelvic colon), *Āmāsaya* (stomach), *Pakvāsaya* (colon), *Uttaraguda* (rectum), *Adharaguda* (anus), *Kṣudrāntra* (small intestine), *Sthulāntra* (large intestine) and *Vapāvahana* (omentum). While according to *Vāgbhatta Koṣṭhāṅga* (organs inside the thorax and abdomen) are the *Hṛdaya* (heart), *Phuphphusa* (lungs), *Yakṛt* (liver), *Plīhā* (spleen), *Uṇḍuka* (caecum), two *Vrikka* (kidneys), *Nābhi* (umbilicus), *Dimbha*, *Āntra* (intestines) and *Basti* (urinary bladder).

Description of Hṛdaya (Heart)

The *Hṛdaya* is formed from the *Prasād bhāg* of the *Rakta* and *Kapha*. The *Hṛdaya* is the supporter of the *Prāṇavaha* (life carrying) *Dhamanī*. Below it, on the left side are the *Plīhā* (spleen) and the *Phuphphusa* (lung) and on the right side are the *Yākṛt* (liver) and *Kloma*. The heart, in particular, is the site of *Cetanā* (consciousness) and when this is covered by *Tamas*, all living beings sleep. *Harati* means it receives the blood through veins from whole body. *Dadāti* means gives or distributes blood to whole body through arteries and *Yachhati* means movement. *Hṛdaya*, similar to *Puṇḍarīka* (lotus bud) is facing downwards; it opens when the person is awake and closes when he is asleep. According to *Vāgbhatta* in middle of the thoracic cavity, between the two nipples and at the opening of the *Āmāsaya* is the site of *Hṛdaya*, which is also site of *Satva*.

Position of Basti (Urinary bladder)

According to *Suśruta* *Basti* is situated between the *Nābhi* and *Prṣṭha* in the region of *Kaṭī* and *Vankṣaṇa pradeśa* and it is closely related with *Muṣka* (*Andakoṣa*), *guda*, *śepha* and it is thin walled and has a single outlet that is directed inferiorly. *Basti* is situated in *Gudāsthivivar pradeśa* and it is closely related with the *Pauruṣam*, *Vṛṣaṇa* and *Guda*. The *Basti* resembles like a gourd and is fixed on all sides by the *Sirā* and *Snāyu*. This is a site for collection of *Mutra*, a base for the *Mala* and is foremost amongst those organs which sustain life. According to *Caraka*, *Basti* is located in the mid of *Sthulaguda*, *muṣka*, *sevanī* and seminal as well as urinary channels, is the receptor of urine into which all the channels of the body carrying liquid elements converge as all the rivers on the earth flow into the ocean. According to *Vāgbhatta* *Basti*, *basti śira*, *medhra* (penis), *Katī*, *Vṛṣaṇa* (testis) and *Pāyu* (rectum) are all related to one another and situated within the *Gudāsthi vivar* (pelvic cavity). Though situated with its mouth directed inferiorly, the *Basti* gets filled from all its sides through the minute channels carrying urine, which are secreting (oozing) without any interruption. The *Doṣās* entering the bladder through these channels produces the twenty kinds of *Mūtrāghāta* and *Prameha* in this *Marma*. *Mutrāsaya* curved like a bow, made up of very little of *Māmsa* and *Rakta*, located in the pelvis, with one orifice pointed inferiorly, it is the *Basti*; injury to it causes death quickly.

Position of Yakṛt and Plīhā (liver and spleen)

Plīhā is situated on the left side, becomes enlarged. Similar to the Plīhā, the Yakṛt situated in the right side may enlarge which eventually leads to enlargement of abdomen.

Position of Āmāśaya (Stomach)

Āmāśaya is situated in between Nābhi (umbilicus) and Stana (Nipples), where the Aśita (eatables), Khādīt (chewables), Pīta (drinkables) and Līdh (lickables) get digested.

Description of Garbhāśaya

Suśruta explains the shape, location and appearance of the uterus is similar to that of the mouth of a Rohita fish. In females, the uterus is situated beside the Basti between the Pittāśaya and the Pakvāśaya where the foetus lies.

Pramāṇa Śārīr (Concept of Anthropometry)

According to Suśruta the measures have been described with one's own Āṅgula (Fingers) as the yardstick. The male or female, possessing all these standard criteria will be having healthy and disease free life. Among them those having medium proportions will have moderate life expectancy and wealth while one of inferior proportion is poor in both. The measurements of the body are described by the measures of individual Āṅgula in terms of height, breadth and length respectively. Thus measurements of the body parts are discussed separately. The entire body measures eighty four Āṅgula in height and also in breadth. The persons having normal measurement of the body will possess longevity, strength, immunity, happiness, supremacy, wealth and other desired qualities. Those having body with less or more measurements have qualities contrary to these.

Description of Marma (Vital points)

There are one hundred and seven Marmās. These Marma are of five types. They are as follows: Marma are located in the Māmsa (muscles), Śīrās (vessels), Snāyu (ligaments), Asthi (bones) and Sandhi (joints). In fact, Marmās are none else than the Māmsa, śīrā, snāyu, asthi and Sandhi; because they are not found elsewhere. There are eleven Māmsa marma, forty one Śīrā marma, twenty seven Snāyu marma, eight Asthi marma and twenty Sandhi marma. In this way there are one hundred and seven Marmās. Out of these, there are eleven Marmās in each inferior extremity. Similar number of Marmās is present in two superior extremities also. The thorax and abdomen have twelve Marmās; the back has fourteen and there are thirty seven in the neck and the region above it. These are classified into five groups as Sadhya prāṇahara (instantly fatal), Kālāntara prāṇahara (fatal after a time), Viśalyaghna (fatal on extraction of foreign body), Vaikalyakara (disabling) and Rujākara (painful). Nineteen are Sadhya prāṇahara, thirty three are Kālāntara prāṇahara, three are Viśalyaghna, forty four are Vaikalyakara and eight are Rujākara marma. The areas where Māmsa, śīrā, snāyu, asthi and Sandhi meet together are known as Marma, which by their virtue of nature are specially the sites of Prāna (life). Therefore, an injury to any one of the Marma invariably produces characteristic features. Injury to Sadhya prāṇahara marma kills within a week. The Kālāntara prāṇahara marma kills within a fortnight or a month. Out of these, injury to the Kṣipra marma may kill even earlier. The Viśalyaghna marma when traumatised, kill sometimes.

Concept of Srotas(systemic anatomy)

Acharya Sushruta has clear the Srotas as the hollow channel except Sira and Dhamani which originating from root space spreads in the body and circulate and exude of the specific entities. Dalhan commentator of Sushruta Samhita, accepted in his commentary that all the structures through which Prana, Anna, Jala, Rasa etc Dhatus and Malas circulate are called as Srotas. It is simply a hollow channel or space present in our body. Srotas is independent element in the body which makes or constitutes its own. It is independent of its location and materials which are transported through it. The Bhava Padartha which is transported through it cannot be independently referred to as Srotas, but are vital for the Srotas to perform its designated function. Generalized treatment of these channels is described in our classic so the physician is also advised to consider the existence of the dosha in that particular condition

Concept of Dhamanī and śīrā (Artery and vein)

Dhamanīs (artery) are called so due to pulsation, Srotas (channel) due to flowing and Śīrā (vein) due to moving slowly. Puncturing the vein should be done in diseases curable by Raktamokṣaṇa (bloodletting), even in other diseases which have not become Pakva, also in those diseases not indicated it can be done by practice and after adopting appropriate procedure.

Description of Tvacā (Skin)

When life is thus induced through the combination of Śukra and Śoṇita, it undergoes rapid transformation; the seven layers of Tvacā are formed in the same manner as the layers of cream are formed on the surface of boiled milk. Out of these seven, the first layer from outside is known as Avabhāsinī. This reflects all the colours and the five Bhutās are brought into light. The thickness of this layer is one-eighteenth of the Vrīhi (rice grain). This is the site of the Sidhma and Padma kaṇṭaka (skin diseases). The second layer is called Lohitā (reddish layer); its thickness is one-sixteenth of the thickness of the Vrīhi and this layer is the site of Tilakālaka, nyaccha and Vyāṅga. The third layer is called Śvetā (white layer); it measures one-twelfth of the thickness of rice grain and it is the site of Carmadala, ajagallī and Maṣaka. The fourth layer is known as Tāmrā (pigment layer) which measures one-eighth of the thickness of Vrīhi and is the site of varieties of Kilāsa and Kuṣṭha. The fifth layer is called Vedinī (sensory layer); the thickness of this layer is one-fifth of the thickness of Vrīhi and it is the site of Kuṣṭha and Visarpa. The sixth layer is known as Rohinī (proliferating layer) and the thickness of this is equal to the thickness of Vrīhi. It is the site of Granthi, apacī, arbuda, ślīpada and Galagaṇḍa diseases. The seventh layer is called Māmsadharā (muscle supporting layer). It has twice the thickness of Vrīhi. It is the site of Bhagandar, arś and Pidakā. The measurements (of the seven layers) of the Tvacā described here are found in Māmsa (fleshy parts) and not in the forehead or smaller parts like fingers; thus it has been said in connection with the treatment of abdominal diseases that a puncture as deep as a thumb breadth should be made with the help of a trocar and canula.

Description of Nayana budbuda (Eyeball)

Nayana budbuda (Eye ball) should be considered as two Āṅgula in depth, one's own thumb in width (thickness), two and half Āṅgula in circumference; is round resembles the

nipple of a cow and arising from all the *Bhūtās* (five primary elements-*Pṛthvī*, *āp*, *tejas*, *vāyu* and *ākāśa*) and their properties. *Maṇḍala*, *sandhi* and *Patala* are present in *Netra* which are respectively five, six and six in numbers.

Description of Guda (Anus)

According to *Suśruta* the portion just distal to the *Sthūlāntra* (large intestine) for four and a half *Āṅgula* is known the *Guda* (anus). There are three *Valaya* at intervals of one and half *Āṅgula* each, known as *Pravāhaṇī*, *visarjaṇī* and *Samvarṇī* and are four *Āṅgula* in diameter. All of them project obliquely for one *Āṅgula*. They are also spiral like conch and are situated one above the other. They have also been described to be of the colour of the palate of an elephant. The anal lips have been described to be one and half *Yava* (barley) from the end of the hair line. Thus the first *Valaya* is one *Āṅgula* above the anal lips. According to *Vāgbhatta* Attached to *Sthūlāntra* is *Guda*, which expels flatus and faeces, its injury leads to quick death.

DISCUSSION

Discussion is the basic step in establishment of a proposition and help in reaching to definite conclusion. It plays an important role in any scientific research work. *Ācārya* also gave *Upanaya* (discussion) prior to *Nigamana* (conclusion). It forms a base for conclusion. It is the process to re-examine the whole work. As *Śārīr racanā* described in *Samhitā* is not the pure anatomy but it is actually physiological anatomy. So, each and every aspect described has more meaning and importance than as idle and straight forward in modern anatomy.

Suśruta was the first person who resorted to human dissection to understand the structures of the body in detail. So we see that the basics for cadaveric preservation are still the same for the purpose of dissection. By the unique method of scraping the body layer by layer he was able to remove the superficial fascia without damaging the soft structures & to note the features of various body parts and describe them accurately. Regional anatomy is one of the important branches of macroscopic anatomy. Similar to *Āyurveda*, according to the modern science the regional anatomy considers the organization of the body as major parts or segments: a main body consisting of the head, neck and trunk (subdivided into thorax, abdomen, back and pelvis/perineum) and paired upper limbs and lower limbs.

According to modern anatomy, there are about 206 bones in the adult human skeleton. The early Indian anatomist, on the other hand, count either 360 (*Ātreya*) or 300 (*Suśruta*) bones. This vast difference is principally due to the facts that (besides including the teeth, nails and cartilages) they counted prominent parts of bones, such are now known as 'processes' or 'protuberances'. This difference may be due to the basis of counting bones in modern and ancient science. Modern science includes only that structures as bones which contains haversian system while in ancient times the basis may be the hardness of the body part and they also counted that structures which decay very late after death.

In this section some basic concepts are collected to show that scientific knowledge of human anatomy was very well known to ancient seers. Some concepts like human dissection, *Ṣaḍaṅga Śārīr*, *Asthi Śārīr*, *Sandhi Śārīr*, *Garbha Śārīr*, Description of *Peśī*, *snāyu*, *koṣṭhā*, *koṣṭhāṅga*, *tvacā*, *guda*, *mukha avayava*, *indriya*, *śira*, *bahirmukha srotas*, *nayana*

budbuda, *dhamanī*, *śirā*, anatomical positions in different procedures like in *Nasya*, *basti*, *cikitsā* of *dakodara*, *baddhagudodara*, *parisrāvyuodara*, *arśa*, *aśmarī*, *mūḍha garbha*, *arma chedana*, *lekhya roga*, *paśmakopa*, *linganāśa*, position of different organs in body like *āmāsaya*, *yakṛt*, *plīhā*, *hṛdaya*, *basti*, *karna bandha vidhi*, *nāsikā sandhān vidhi*, *auṣṭha sandhān vidhi*, *yogyā sutriya*, *sadhya vṛaṇa*, *aṣṭavidha śastrakarma*, *sivana karma*, *Pramāṇa Śārīr*, and concept of *Marma* are described in this part. Discussion on all the points like human dissection, *Ṣaḍaṅga śārīr*, *asthi śārīr*, *sandhi śārīr*, position of *Hṛdaya*, *basti*, *cikitsā* of *arśa*, *aśmarī* etc., mentioned in review of *Āyurvedic* literature, is done. All these points are compared to modern science to show that all these knowledge of anatomy was also present in that time in *Sūtra rūp*.

CONCLUSION

Conclusion is the essence of any study thus, any research work is to be completed by giving a final conclusion which reflects the work accomplished as well as paves the path for further works. *Suśruta* was the first person who resorted to human dissection to understand the structures of the body in detail. By the unique method of scraping the body layer by layer he also noted the features of various structures and described them accurately. The concept of regional anatomy was given as *Ṣaḍaṅga śārīr* in *Āyurveda*. Classification of bones based on shape, size and texture was given firstly in *Samhitā*. *Ācārya* has also given the classification of bones on the basis of fracture in them. The concept of surface marking & its clinical relevance was very well known to *Ācārya* as they mentioned the position of organs such as *Āmāsaya*, *hṛdaya* etc. *Ācārya* has mentioned anatomical positions for *Nasya* and *Basti* procedures. It shows that they were well known about different routes of drug administration. The positions for different procedures like *Nasya*, *basti*, *cikitsā* of *Dakodara*, *arś*, *aśmarī* etc. mentioned in *Āyurveda* is followed by modern science in nowadays. The concept of developmental embryology is mentioned in *Āyurveda* is as *Garbha śārīr*. With advancement of time, science is expanding its wings in every field but basic principles remain always unchanged. That's why modern science also follows all these ancient principles so the knowledge generally found in modern medical literature is nothing but the amendment of *Āyurvedic* knowledge or literature.

References

1. Susruta Samhita with commentary of Nibandhasamgraha and Nyayachandrika in hindi translation by Dr. Kewal Krishna Thakarala, Chaukhamba Orientalia Varanasi, 2014.
2. Susruta Samhita, with English translation, Dalhana's commentary, Vol-I, II&III P.V. Sharma, Chaukhamba Visvabharati Varanasi. 1999
3. Soni Gaurav *et al*: A Review Study Of Asthi Sharir W.S.R. To Bhagna Chikitsa, *IAMJ*: Volume 3; Issue 6; June- 2015
4. Gaurav *et al*. Concepts of Asthi Sharir (Osteology) In Ayurveda, *World Journal of Pharmaceutical Research*, Vol 4, Issue 08, 2015.
5. Susruta Samhita with commentary of Nibandhasamgraha and Nyayachandrika in hindi translation by Dr. Kewal Krishna Thakarala, Chaukhamba Orientalia Varanasi, 2014

6. Ashtanga Hridaya, with the commentaries: Sarvangasundara of Arundatta, & Ayurveda Rasayana of Hemadri, annotated by Dr. Anna Moreswar Kunte, Chaukhamba Surbharati Prakashana Varanasi.
7. Ashtanga Hridaya with commentaries "Sarwanga Sundara" by Acharya Lalchandra Motilal Banarasidas Varanasi 2008.
8. Charak Samhita with English Translation with Ayurveda Deepika Commentary by Dr. R. K. Sharma and Dr. Bhagvan Dash, Chaukhamba Sanskrit Series, Varanasi, 2013.
9. Sandeep Lahange *et al.*, *World Journal of Pharmaceutical Research Critical Appraisal* on Raktavaha Srotas in Context to Raktapradoshaj Vyadhi, Vol 6, Issue 1, 2017.
10. Chhaya *et al.* *World Journal of Pharmaceutical Research*, Review of Aamashaya as Per Classics and Its Correlation With Modern Science, Vol 5, Issue 12, 2016.
11. Susruta Samhita with commentary of Nibandhasamgraha and Nyayachandrika in hindi translation by Dr. Kewal Krishna Thakarala, Chaukhamba Orientalia Varanasi, 2014.
12. Lahange *et al.*, A Review Study of Marma Sharir With Special Reference to Its Clinical Importance, *World Journal of Pharmaceutical Research*, Vol 5, Issue 10, 2016. 454.
13. Lahange *et al.* Critical Appraisal on Concept of Srotas in Ayurveda And Its Implication In Clinical Practice *World Journal of Pharmaceutical Research*, Vol 5, Issue 11, 2016.
14. Charaka Samhita with "Ayurvedeepika" commentary by Chakrapanidutta, Acharya Sidhinaandan Mishra, Chaukhamba Samskrit Sanstana, Varanasi, 2009.
15. Susruta Samhita with English translation, Dalhana's commentary Vol-I, II & III P.V. Sharma, Chaukhamba Visvabharati Varanasi. 1999.
