IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

CRITICAL REVIEW ON THE UNDERSTANDING OF CLASSIFICATION OF ASTHI

Chaitra S.*[1] and Shelly Divyadarshan[2]

[1*]Assistant Professor, [2]Associate Professor,

Department of Shareera Rachana,

JSS Ayurveda Medical College, Mysore, India.

Abstract:

In Ayurveda, the term Asthi is mainly used to denote bones. Asthi is a substance that is not going to decompose as fast as other components of the body like muscles, vessels etc. It stays for long time period even after death. The main function of bones in the body is to provide support and protection to other soft tissues. Bones also provide attachments to the skeletal muscles. Asthi is considered as the seat of vaata. Bone is one-third connective tissue. It is impregnated with calcium salts which constitute two-thirds part. The inorganic calcium salts make it hard and rigid. In strength, bone is comparable to iron and steel. Different classification of Asthi mentioned in classics can be corelated with modern science bone classification to some extent like Kapala (flat), Ruchaka (dentures), Taruna (cartilage), Valaya (ribs and cartilage), Nalaka (long bones) which found in various parts of body and perform specific functions.

Keywords*:* Asthi, bones, cartilage

INTRODUCTION:

In Ayurveda, the term Asthi is mainly used to denote bones. Asthi is a substance that is not going to decompose as fast as other components of the body like muscles, vessels etc. It stays for long time period even after death. The main function of bones in the body is to provide support and protection to other soft tissues. Bones also provide attachments to the skeletal muscles. Asthi is considered as the seat of vaata.[1]

Bone is one-third connective tissue. It is impregnated with calcium salts which constitute two-thirds part. The inorganic calcium salts make it hard and rigid. In strength, bone is comparable to iron and steel.

In Ayurveda, scientific classification of Asthi with their clinical anatomy is explained. In Atharvaveda and Yagnavalkya 360 bones are told, by which it is clear that from Vedic era itself numbering of Asthi is mentioned along with giving importance to Asthi Shareera.[2] According to Bruhatrayee and Laghutrayee numbering of different types of bones are done. Sushruta also does classification of bones into 5 different types based on their appearance and its location on different parts of body.[3]

ASTHI PRAKARA(CLASSIFICATION OF BONES):

Acharya Sushruta explained 5 types of Asthi i.e. Kapala, Ruchaka, Taruna, Valaya and Nalaka.[4]

1. Kapala- These are flat in nature. Literally, it is potential bone which covers and defends brain. This kind of Asthi present at Janu(patella), Ganda(cheek bone), Shira, Nitamba(pelvic bone), Talu(palatine bone), Amsa(scapula), Shankha(temporal bone).
2. Ruchaka- Dashanas(teeth) are viewed as the Ruchakasthi.
3. Taruna- soft in nature, these are not fully developed i.e. bones of child therefore termed as *Taruna Asthi.* Asthi existing at Ghrana(nose), Karna(ear), Ghriva(neck), Akshikosha(eye socket) are instance for Taruna Asthi.
4. Valyasthi-bones which are curved in shape and which are present over Parshwa(sides), Prushta(back), Uras(thoracic region) are considered as Valayasthi.
5. Nalakasthi- These are the long bones which existat Hastanguli(fingers), Padanguli(toe fingers), Bahu Asthi (bones of arm), Jangha Asthi (bones of thigh region) etc.

According to Bhavaprakasha, there are 5 types of Asthi[5] . They are as follows,

1. Kapala - Ashikosha, Shruti, Graana, Greeva
2. Ruchaka - Danta
3. Taruna - Shira, Shanka, Kapala, Taalu, Amsa, Jaanu.
4. Valaya - Paarshini, Paarshva, Prishta, Vaksha, Jatara, Paayu, Paada.
5. Nalaka - Hastha, Paadangulitala, Kurcha, Manibhanda, Baahudvaya, Janghadvaya.

CLASSIFICATION OF BONES [6]

A. According to Shape

1. **Long bones:** Each long bone has an elongated shaft (diaphysis) and two expanded ends (epiphyses) which are smooth and articular. The shaft typically has 3 surfaces separated by 3 borders, a central medullary cavity, and a nutrient foramen directed away from the growing end.

Examples: humerus, radius, ulna, femur, tibia and fibula;

2. **Short long bones:** These are miniature long bones have only one epiphysis like,metacarpals, metatarsals and phalanges;
3. **Short bones:** Their shape is usually cuboid, cuneiform, trapezoid, or scaphoid.

Examples: tarsal and carpal bones.

4. **Flat bones** resemble shallow plates and form boundaries of certain body cavities.

Examples: bones in the vault of the skull, ribs, sternum and scapula.

5.**Irregular bones:** Irregular bones serve various purposes in the body, such as protection of Nervous tissue, affording multiple anchors points for Skeleton muscle attachment etc.

Examples: vertebra, hip bone, and bones in the base of the skull.

6. **Pneumatic bones:** Certain irregular bones contain large air spaces lined by epithelium. They make the skull light in weight, help in resonance of voice, and act as air conditioning chambers for the inspired air.

Examples: maxilla, sphenoid, ethmoid,etc.

7. **Sesamoid bones:** These are bony nodules found embedded in the tendons or joint capsules. They have no periosteum and ossify after birth. They are related to an articular or non-articular bony surface, and the surfaces of contact are covered with hyaline cartilage and lubricated by a bursa or synovial membrane.

Examples: patella, pisiform, fabella, etc.

B. Developmental Classification

1. **Membrane (dermal) bones** ossify in membrane (intramembranous or mesenchymal ossification), and are thus derived from mesenchymal condensations.

Examples: bones of the vault of skull and facial bones.

2. **Cartilaginous bones** ossify in cartilage (intracartilaginous or endochondral ossification), and are thus derived from preformed cartilaginous models.

Examples: bones of limbs, vertebral column and thoracic cage.

3. **Membrano-cartilaginous bones** ossify partly in membrane and partly in cartilage.

Examples: clavicle, mandible, occipital, temporal, sphenoid.

C. Regional Classification

1. **Axial skeleton** includes skull, vertebral column, and thoracic cage.
2. **Appendicular skeleton** includes bones of the limbs.

D. Structural Classification

I. ***Macroscopically,*** the architecture of bone may be compact or cancellous.

1. **Compact bone:**

It is dense in texture like ivory, but is extremely porous. It is best developed in the cortex of the long bones. This is an adaptation to bending and twisting forces (a combination of compression, tension and shear).

2. **Cancellous or spongy, or trabecular bone:**

It is open in texture, and is made up of a meshwork of trabeculae (rods and plates) between which are marrow containing spaces.

II. ***Microscopically,*** the bone is of five types, namely lamellar (including both compact and cancellous), woven, fibrous, dentine and cement.

1**. Lamellar bone:** Most of the mature human bones, whether compact or cancellous, are composed of thin plates of bony tissue called lamellae. These are arranged in piles in a cancellous bone, but in concentric cylinders (Haversian system or secondary osteon) in a compact bone.

2. **Woven Bone:** seen in fetal bone, fracture repair and in cancer of bone
3. **Fibrous bone** is found in young foetal bones, but are common in reptiles and amphibia.
4. **Dentine** and
5. **Cement** occur in teeth.

DISCUSSION:

There are different opinions regarding the enumeration of Asthi as per Acharyas. Sushruta has given a count number of 300 Asthi. According to Charaka and Vagbhatta, Asthi Sankhya is 360 in number. [7,8] They both included nails, nail mattress, teeth and teeth sockets as bones. But these structures are not included under bones as per modern anatomy. It can make a large distinction in whole count of Asthi. According to anatomy there are 206 bones are present in human skeleton. Sushruta's view of Asthi Sankhya appears to be nearer to the clarification of contemporary anatomy. As per Sushruta, there are 5 types of asthi are present. *Kapala asthis* are flat, covers and protects brain. It can be corelated with flat bones classified based on the shape as per modern classification. *Ruchaka Asthis* are differently made to chew food and related with taste sensation. *Dashanas(Tooth)* are included under this category. But teeth is not considered as bone according to modern science. But microscopically, Bones are divided into cement and dentine which are present in teeth. As teeth are hard structures of the body, they are included under the five classifications of asthi as per Ayurveda. *Taruna Asthis* are soft in nature, these are not fully developed i.e. bones of child therefore termed as *Taruna Asthi. In modern science,* woven bone is the major bone type in the developing fetus. It is characterized by the irregular arrangement of collagen fibers, large cell number, and reduced mineral content. Woven bone is deposited on hyaline cartilage. This can be understood as Taruna asthi. *Valaya Asthis* are round or hemi circle in shape. Ribs are included under this category. *Nalika-Asthis* are long, hollow like tubes. All long bones comes under Nalaka asthi. Different classification of Asthi mentioned in classics can be corelated with modern science bone classification to some extent like Kapala (flat), Ruchaka (dentures), Taruna (cartilage), Valaya (ribs and cartilage), Nalaka (long bones).

CONCLUSION:

Ayurveda described skeleton system as *Asthi Sharira. Asthi* is considered as one among the Saptha *Dhatus* of body that helps to maintain body framework and provides supports to the body. *Asthi* is predominantly composed of *Prithivi* and *Vayu Mahabhuta*. The roughness, firmness, solidity and toughness, etc. of *Asthi* can be attributed to their *Mahabhuta* compositions. The major abnormalities of *Asthi* involves symptoms of *Vata* vitiation. There are different types of *Asthi* including *Kapala-Asthi, Valaya-Asthi, Taruna-Asthi, Nalika-Asthi* and *Ruchaka-Asthi* which found in various parts of body and perform specific functions.

REFERENCE:

1. A text book of Ayurvedic Anatomy by Prof.C.R.Agnives, 3rd Edition, Harisree Publications, Thrissur, 2021, Chapter 5, Pg. 125.
2. Acharya yadavji trivikramji Sushruta samhita Dalhana comentary Shareera sthana Shareera sankhya vyakarana Shareera Chowkambha publications Varanasi Chapter 5 verse :18 page no :364.
3. Acharya yadavji trivikramji Sushruta samhita Dalhana comentary Shareera sthana Shareera sankhya vyakarana Shareera Chowkambha publications Varanasi Chapter 5 verse :20 page no :364
4. Sushruta Samhita with Nibandha Sangraha Commentary of Dalhanacharya and Nyayachandrika Panchika of Gayadasa, edited by YadavjiTrikamji Acharya, Published by Chaukhamba Orientalia, Varanasi, Reprint-2017 Sutrasthan Chapter-15/8, Page no. 73.
5. A text book of Ayurvedic Anatomy by Prof.C.R.Agnive, 3rd Edition, Harisree Publications, Thrissur, 2021, Chapter 5, Pg. 125.
6. B.D.Chourasia's Handbook of General Anatomy by late B.D.Chourasia, edited by Dr.Krishna Garg, 4th edition, CBS Publishers and distributors, Pvt Ltd, New Delhi, Reprint-2013, Chapter no. 2, Page no. 32,36-39.
7.Charaka Samhita with Ayurveda Deepika Commentary of Chakrapanidatta, edited by Vaidya Harish Chandra Singh Kushwaha, Choukamba Orientation Varanasi, Reprint-2012 Chikitsa Sthana, Chapter- 15, Page no.456.
8.Vagbhata Astanga Hrudayam with Sarvanga Sundara Commentary of Arunadatta and Ayurveda Ramayana of Hemadri. Edited by Bhisagacharya Hari Shastri Paradakara Vaidya, 8th edition. Varanasi: Chaukhambha Orientalia, Chapter no. 11/29, Pg117.