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CONCEPT OF SANDHI SHARIR: A REVIEW

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ABSTRACT

Life would not have been the way it is if we would have not been able to move around. Movement is the key for progression and success and joints of our body are the basic to movement. These joints are the junctions of bone well supported by soft tissues like muscles, ligaments and tendons. Sandhi means samyoga or junction or union, and sandhi sharir can be simulated with study of joints. In Ayurvedic classics by the word sandhi we meet meeting of two structures but for the purpose of understanding, only Asthi Sandhi are considered under the term sandhi. Other joints like joints of muscles, vessels, tendons etc are excluded from counting. Based on the range of movement there is a broad classification into Cheshtavanta and Acheshta. Structurally, Sandhi are divided into 8 types. In modern literature also joint classification is done on structural and functional basis. A difference in counting the numbers of sandhi is seen between various acharya. The current review article has made an attempt to study the description available on Sandhi Sharir in ayurvedic classics and comparing it with the available mordern literature on joints.

KEYWORDS: Sandhi Sharir, Joints, Movement, Asthi sandhi.

INTRODUCTION

The changing life style from an active one to the sedentary, from healthy food habits to health affecting fast foods has created an environment where the incidence of life style associated metabolic diseases has increased. These diseases are affecting the human body in various ways. If we talk about the joints of our body they are also adversely affected to these metabolic imbalances.

With increasing incidence, emerged a need to understand the basic structure of joints with modern as well as ayurvedic aspects. In ayurvedic classics, the structural entity of sandhi is not described in detail. However as per the definition given in ayurvedic classics Sandhi are said to be the meeting point of the two or more structures or to unite or Asthi Samyoga Sthana.[1]

Ayurvedic review

On viewing the description available in Sushruta Samhita, we can say that Acharya Sushruta took into account only Asthi Sandhi while counting the numbers of Sandhi, whereas excluding other Sandhi of Snayu, peshi and Sira as they are in- numerable.[2]

If we consider the number of sandhi in human body, we see that various ayurvedic classics counted different number of sandhi. Considering Brahatrayi Granths number of sandhi in Charak Samhita[3], Sushruta Samhita and Ashtanga Hridaya[4] are 200, 210, 210 respectively. Of this 210 sandhi sixty-eight are in the four extremities; fifty-nine in the trunk (Koshtha); and eighty-three in the neck and the region above it.[5]

Classification of Sandhi

Main classification of sandhi is of two types

1. Kriyanusar Vargeekaran (Based on Kriya/Movement): These are further subdivided into following two types-

(a) Chal (Cheshtayukta Sandhi) Diarthrosis;

(b) Achal (Sthira Sandhi) Synarthrosis.

The Sandhi which are situated in the Shakha, Kati and Hanu are Cheshtayukta Sandhi while all the remaining Sandhi comes under the Sthira in nature.

The Cheshtayukta Sandhi are further classified into two types based on their extent of movement. They are

(a) Bahuchal (freely movable);

(b) Alpachal (slightly movable)

The Sandhi of Shakha, Kati and Hanu are of Bahuchal variety and the Sandhi of Prushtha etc. are Alpachal variety

2. Rachananusar Sandhi Vargeekaran (Based on Rachana/Structure)

Acharya Sushruta had described 8 types of Sandhi on the basis of structure. They are Kora, Ulukhala, Samudga, Pratara, Tunnasevani, Vayastunda, Mandala and Shankhavarta.

i) Kora Sandhi: As per the description of Haranchandra in commentary of Sushruta Samhita, Kapat etc. is taken for Nibandhan of a special devise called Kora is known that the Kabja (hinges). The Kora Sandhi is seen in the following region- Anguli, Manibandha, Gulpha, Janu and Kurpara.

ii) Ulukhala Sandhi: These types of Sandhi look like stone grinder used in the kitchen in olden days that's why it is named so. The Ulukhala variety of joints is found at Kaksha, Vankshana and Dashana.

iii) Samudga Sandhi: This variety of Sandhi looks like a box. These Samudga Sandhi is seen at Ansapeeth, Guda, Bhaga and Nitamba.

iv) Pratara Sandhi: According to Dalhana, the articulating surfaces of this variety of joint are flat in nature and floating, supported by cushion and friction is seen in between the articulating surfaces. In Acharya Sushruta's opinion this variety of joints are located at Greeva Kasherukha and Prushthavansha.

v) Tunnasevani Sandhi: The commentator Gananath Sen has an opinion that articulating surfaces of this sandhi resembles dentate edges which are supported and tucked together or embedded into one other. This type of Sandhi is found at Sirakapala and Katikapala.

vi) Vayastunda Sandhi: According to Gananath Sen the Hanu which is situated within Shankhasthi both side of chin is considered as Vayastunda Sandhi. Acharya Sushruta has got similar opinion about Vayastunda Sandhi.

vii) Mandala Sandhi: According to Dalhana the Sandhi, which are oval or round are called as Mandala Sandhi. This type of Sandhi is present in Kantha, Hridaya and Netra, Klomnadi.

viii) Shankhavarta Sandhi: According to Haranachandra, these are circular in nature which resembles the circles of a snail or Shankha. As per Acharya Sushruta they are found in Shrotra and Shringataka.

Modern Review[6,7]

Definition

- Joint is a junction two or more bones or cartilages.
- An articulation is a point of contact between bones between cartilages and bones, or between teeth and bones

Joints (articulations) are unions between two or more bones or rigid parts of the skeleton. They exhibit a variety of forms and functions and are constructed to allow for different degrees and types of movement.

Classification of joints

Joints are classified structurally, based on their anatomical characteristics, and functionally, based on the type of movement they permit.

(i) Structurally Classification of joints:

Structurally, joints are classified as one of the following types: Fibrous joints, cartilaginous joints, Synovial joints.

1. Fibrous Joints: There is no synovial cavity, and bones are held together by fibrous connective tissue. These permits little or no movement and are of three types -sutures, syndesmoses and interosseous membranes. Example- suture of skull, teeth-jaw, lower end of tibia and fibula.
2. Cartilaginous Joints: There is no synovial cavity and the bone are held together by cartilage and allows little or no movement. The articulating bones are tightly connected by either hyaline cartilage or fibrocartilage and are of two types - primary cartilaginous and secondary cartilaginous joint. Example- pubis symphysis, diaphysis and epiphysis, first costal cartilage and manubrium sterni.
3. Synovial Joints: The unique characteristic of a synovial joint is the presence of a space called a synovial (joint) cavity between the articulating bones. Because the synovial cavity allows a joint to be freely movable, all synovial joints are classified functionally as diarthroses. The bones at a synovial joint are covered by a layer of hyaline cartilage called articular cartilage. The cartilage covers the articulating surface of the bones with a smooth, slippery surface but does not bind them together. Articular cartilage reduces friction between bones in the joint during movement and helps to absorb sock. Example- Shoulder joint and hip joint.

(ii) Functional-classification of joints

[I] Synarthrosis (Immovable)

1. Suture (seem)-Found only between bones of the skull; articulating bones united by a thin layer of dense fibrous connective tissue. Example – Coronal suture between frontal and parietal bones.

2. Gomphosis (To bolt together) – Cone shaped peg fits into a socket; articulating bones united by periodontal. Example- Roots of teeth in alveolo (Socket)

3. Syndesmosis (Bend or ligament) – Articulating bones united by dense fibrous connective tissue.

(II) Amphiarthrosis (Slightly movable)

1. Synchondrosis (Together-cartilage)- Primary cartilaginous joint. Connecting materials is hyaline cartilage. Example- Temporary joint between the diaphysis and epiphysis of a long bone.

2. Symphysis (Growing-together)- Secondary cartilaginous joint. Connecting material is a broad, flat disc of fibrocartilage. Example- Intervertebral discs and pubic symphysis.

(III) Diarthrosis (Freely movable)

1. Gliding (Arthrodial joint) – Articulating surfaces usually flat, Example- Intercarpal and intertarsal joint, Gliding joint between the navicular and II, III cuneiforms of the tarsal bone.
2. Hinge (Ginglymus joint)- Convex surface fits into a concave surface. Example- Elbow ankle and interphalangeal joint, Hinge joint between the trochlea of humerus and trochlear notch of ulna at the elbow.
3. Pivot (Trochoid (wheel) joint)- Rounded or pointed surface fits into a ring formed partly by bone and partly by a ligament. Example- Joint between atlas and axis, joint at proximal ends of radius and ulna, Pivot joint between head of radius and radial notch of ulna.
4. Condyloid (Ellipsoid joint)- Oval shaped condyle fits into an elliptical (round) cavity of another bones. Example- Joint between radius and carpals (scaphoid and lunate), Temporo-mandibular joint, Knee joint.
5. Saddle (Saller joint) – Articular surface of one bone is saddle shaped and the articular surface of the other bone is shaped like legs of a rider sitting in the saddle. Example- Joint between trapezium of carpus and metacarpal of thumb.
6. Ball and socket (Spheroid joint)- Ball like surface of one bone fitted in to a cuplike depression of another bone. Example- Shoulder joint and hip Joint, Ball and socket joint between head of femur and acetabulum of the hip bone.

DISCUSSION

In Ayurvedic classics, Sandhi have been classified into eight types by taking into account mainly the shapes of Sandhi, movement of Sandhi has not been considered while describing these eight types. However, in modern science, the classification of Sandhi has been done by taking account of both structure and function (movement) of the joint. In the following table an attempt has been made to relate ayurvedic classification as well as modern classification on the basis of the knowledge acquired while reviewing the description of sandhi and joint.

Table No. 1: Showing division of sandhi as per Ayurveda along with their modern correlations.

Sl. No.	Type of joint	Examples	Correlation of examples	Correlated joint as per modern classification
1.	Kora Sandhi	Anguli	Interphalangeal joint	Hinge Joint
		Manibandha	Wrist Joint	Ellipsoid variety of synovial joint
		Gulpha	Ankle Joint	Hinge Joint
		Janu	Knee Joint	Compound synovial joint with condylar joint
		Kurpara	Elbow Joint	Hinge Joint
2.	Ulukhala Sandhi	Kaksha	Shoulder Joint	Ball and socket Joint
		Vankshana	Hip Joint	Ball and socket joint
		Dashana	Teeth	Gomphosis joint
3.	Samudga Sandhi	Ansapeeth	Acromio-clavicular joint	Plane joint
		Guda	Sacrum	Secondary Cartilaginous joint
		Bhaga	Pubis	Secondary Cartilaginous joint
		Nitamba	Ilium	Plane joint
4.	Pratara Sandhi	Greeva	Cervical Vertebrae	Secondary Cartilaginous joint
		Prushthavansha	Thoracic vertebrae	Secondary Cartilaginous joint
5.	Tunnasevani Sandhi	Sirakapala	Skull	Sutures
		Katikapala	Hipbone-sacrum, coccyx	Sutures
6.	Vayastunda Sandhi	Hanvasti	Temporo-Mandibular Joint	Condylar joint
7.	Mandala Sandhi	Kantha	Throat	Junction areas between muscles, tendons, vessels.
		Hridaya	Heart	
		Netra	Eye	
		Klomanadi	Trachea	
8.	Shankhavarta Sandhi	Shrota	Ear	Joint of ear ossicles along with cochlea
		Shringataka	Cavernous Sinus	Conchae

CONCLUSION

On the basis of the review and discussion we can conclude that:

- The various classical texts of Ayurveda have defined Sandhi are meeting place of two or more Asthi.
- Ayurveda and modern science both have somewhat similar classification basis of Sandhi(joint)and they can be corelated as-

➢ Kora Sandhi can be considered as hinge joint,

➢ Ulukhala Sandhi may include ball and socket variety of synovial joint and gomphosis variety of fibrous joint.

➢ Ansapeeth, Guda, Bhaga, Nitamba has Samudga Sandhi can be considered as acromioclavicular, sacrococcygeal, pubic symphysis, and sacroiliac joint respectively.

➢ In Pratara, Greeva and Prushthavansha may include intervertebral joint.

➢ Sutures as Tunnasevani and Hanu in Vayastunda may be taken a temporo-mandibular.

➢ Shankhavarta include Shrota and Shringataka can be correlated with cochlea and region of nasal conchae.

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