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Arthrology (*Sandhi sharira*) in the Lights of Ayurveda

[1]Dr. Manojkumar G Marathe, [2]Dr. Shalmali A Thube, [3]Dr. Bhagyashree A Rakhunde and [*4]Dr. Atul L Chaudhari

[1]HOD & Professor, Department of Rachana Sharir, KDMGS Ayurvedic Medical College, Chalisgoan, Jalgaon, Maharashtra, India.

[2]Associate Professor, Department of Rachana Sharir, Rashtriya Ayurved College & Research Institute, Hatnoor, Ch. Sambhajinagar, Maharashtra, India.

[3]Assistant Professor, Department of Rachana Sharir, KDMGS Ayurvedic Medical College, Chalisgoan, Jalgaon, Maharashtra, India.

[*4]Assistant Professor, Department of Kayachikitsa, KDMGS Ayurvedic Medical college, Chalisgoan, Jalgaon, Maharashtra, India.

Abstract

Ayurveda categorizes *Sandhi* (joints) into types according to their mobility: *Sthira* (Fixed), *Chala* (Movable), and partially movable joints. This classification aligns closely with contemporary joint categories, which include fibrous (Fixed), synovial (Movable), and cartilaginous (Partially movable) joints. The exploration of *Sandhi Sharira* today connects ancient knowledge with modern scientific understanding, promoting interdisciplinary research to substantiate Ayurvedic concepts in broader clinical practice. There is a strong focus on joint mobility, stability, and overall skeletal health through the integration of Ayurvedic principles and modern scientific approaches.

Keywords: *Ayurveda,* Anatomy, Anthology, *Sandhi Sharira*.

Introduction

The word *Sandhi* means joining of two or more structures. There are innumerable structures are present like arteries, veins muscles, nerves. The embryology, *Sandhi Sankhya,* and *Pitruja Bhava* of *Sandhi* are presented on a broad level. Although *Marma Jala Sanghata* and *Sandhi* are connected, only *Asthi Sandhi* has been taken into account in Ayurveda.

Sandhi Paribhasha

"सन्धयश्चाङ्गसन्धानाद्देहे प्रोक्ताः कफान्विताः"|

As the seat of *kapha* and the points where bones meet, *Sandhi's* aid in holding body's component together.

"अस्थ्नां तु सन्धयो ह्येते केवलाः परिकीर्तिताः |
पेशीस्नायुसिराणां तु सन्धिसङ्ख्या न विद्यते" ||

Shushurta clarified that, as the other *sandhi's* are innumerable so *Shusruta* counted only the *Astha sandhi's.* He has not counted other *sandhi's* like *peshisandhi* (Joint in between muscle), *Snayusandhis* (Joints between nerves), *Sirasandhi* (Joints between veins, arteries and capillaries)

An articulation (Joint) is a point of contact between bones & Cartilage and bones or between teeth & Bones. Joint is a point where two or more bones are articulated with each other. When we say that one bone articulated with another, we mean that one bone forms a joint with another bone.

***Sandhi Sankhya:* (No. of *Sandhis*):**

200 as per Aacharya Charaka.

सङ्ख्यातस्तु दशोत्तरे द्वे शते |

210 as per Aacharya Sushruta.

"तेषां शाखास्वष्टषष्टिः, एकोनषष्टिः कोष्ठे, ग्रीवां प्रत्यूर्ध्वं त्र्यशीतिः| एकैकस्यां पादाङ्गुल्यां त्रयस्त्रयः, द्वावङ्गुष्ठे, ते चतुर्दश; जानुगुल्फवङ्क्षणेष्वेकैकः, एवं सप्तदशैकस्मिन् सक्थ्नि भवन्ति; एतेनेतरसक्थि बाहू च व्याख्यातौ; त्रयः कटीकपालेषु, चतुर्विंशतिः पृष्ठवंशे, तावन्त एव पार्श्वयोः, उरस्यष्टौ; तावन्त एव ग्रीवायां, त्रयः कण्ठे, नाडीषु हृदयक्लोमनिबद्धास्वष्टादश, दन्तपरिमाणा दन्तमूलेषु, एकः काकलके नासायां च, द्वौ वर्त्ममण्डलयोर्नेत्राश्रयौ, गण्डकर्णशङ्खेष्वेकैकः, द्वौ हनुसन्धी, द्वावुपरिष्टाद्भ्रुवोः शङ्खयोश्च, पञ्च शिरःकपालेषु, एको मूर्ध्नि" ||

Sandhis in *Shadangas* comprise 83 in the Head & Neck region, 68 in the four Limbs, and 59 in the *Madhya Sharira* (trunk region).

Shakha Sandhi Sankhya: There are three on each for foot toe and two on the big toe, for a total of fourteen; there are one on

***Corresponding Author:** Dr. Atul L Chaudhari

each knee, ankle, and hip, for total of seventeen on one leg; there are also two arms on the other leg.

Madhya Sharira Sankhya: There are eight in the chest, three in the pelvic bones, twenty-four in the spinal column, and the same on the sides.

Urdhwa Jatrugata Sandhi Sankhya: Chest the same in the neck, three in the throat, eighteen in tubes connected to the *hrudaya Kloma,* in the roots of teeth equal to teeth, one in each of the nose and *Kakalaka* (Uvula), two in the eyelid circles, one in each of the cheeks, ears, and temples, two jaw joints, two above the brows and temples of the eyes, five in the skull bones, and one in the vertex.

***Sandhi Prakara* (Classifications):**

सन्धयस्तु द्विविधाश्चेष्टावन्तः स्थिराश्च ||

Types according to *kriya*: There are two types of joints:

***Chesthavan/Chala Sandhi* (Moveable Joints):**

शाखासु हन्वोः कट्यां च चेष्टावन्तस्तु सन्धयः |

It's a movable joint found in the waist, jaws, and extremities. It includes following;

- *Mani bandha Sandhi* (Wrist joint)
- *Karpura Sandhi* (Elbow joint)
- *Kaksha Sandhi* (Shoulder joint)
- *Gulpha Sandhi* (Ankle joint)
- *Janu Sandhi* (Knee joint)
- *Vamkshana Sandhi* (Hip joint)
- *Hanu Sandhi* (Tempero Mandibular joint)
- *Kati Sandhi* (Lumbo-sacral joint)

Sthira/Achala Sandhi (Fixed joints)

शेषास्तु सन्धयः सर्वे विज्ञेया हि स्थिरा बुधैः ||

Fixed joints category includes all of the others than movable joints.

Types according to *Rachana:*

त एते सन्धयोऽष्टविधाः-
कोरोलूखलसामुद्गप्रतरतुन्नसेवनीवायसतुण्डमण्डलशङ्खावर्ताः|

According to Rachana, 8 types of joints, they are *Kora, Ulukhala, Samudga, Pratara, Tunnasevani, Vayasatunda, Mandala*, and *Shankhavarta.*

1. ***Kora Sandhi*** (Hinge Joint):

तेषामङ्गुलिमणिबन्धगुल्फजानुकूपरेषु कोराः सन्धयः|

The *Kora* Sandhi joint is found in fingers, wrist, ankles, Knees and elbow.

2. ***Ulukhala Sandhi*** (Ball and sacket Joint):

कक्षावङ्क्षणदशनेषूलूखलाः|

The *Ulukhala* joint is found in axilla, hip and teeth.

3. ***Samudga Sandhi*** (Saddle Joint):

अंसपीठगुदभगनितम्बेषु सामुद्गाः|

The *Samudga* joint is found in scapula, anus, perineum, and pelvis.

4. ***Pratara Sandhi*** (Gliding Joint):

ग्रीवापृष्ठवंशयोः प्रतराः|

The *Pratara* joint is found in the vertebrae & neck.

5. ***Tunnasevani Sandhi*** (Suture):

शिरःकटीकपालेषु तुन्नसेवन्यः|

The *Tunnasevani* joint is located in the skull and pelvic bone.

6. ***Vayasatunda Sandhi*** (Condylar Joint):

हन्वोरुभयतस्तु वायसतुण्डाः|

Found in both sides of jaw.

7. ***Mandala Sandhi:***

कण्ठहृदयनेत्रक्लोमनाडीषु मण्डलाः|

Mandala sandhis are present in trachea, heart, eyes, Kloma and nadi.

8. ***Shankhavarta Sandhi:***

श्रोत्रशृङ्गाटकेषु शङ्खावर्ताः |

In the *shrungataka* of the ears are *Shankhavarta* joint.

Classification of joints as per modern:

Joints may be categorized int structural based on anatomical characteristics or into functional classes, based on the type of movement they permit.

Structural Classification:

The structural classification of joints is based on the presence or absence of a space between the articulating bones that is called a synovial (Joint) cavity.

Structurally a joint is classified as

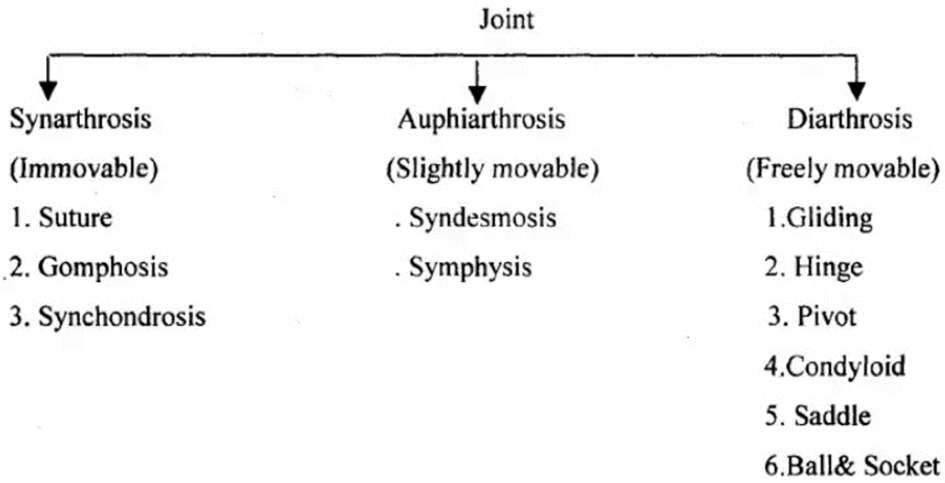
i). **Fibrous:** If there is no synovial cavity the bone is held together by fibrous connective tissue.

ii). **Cartilaginous:** If there is no synovial cavity the bone is held together by cartilage.

iii). **Synovial:** If there is synovial cavity the bones forming the joint are united by a surrounding articular capsule and frequently by accessory ligament

Functional Classification:
It is classified based on movements.

Functional Classification



Types of Other Joints are:
Gomphosis: To bold together. It is a type of fibrous joint in which a cone-shaped peg fits into a socket. The substance between the two is the periodontal ligament. The only examples are the roots of the teeth with the sockets of the alveolar processes of the maxillae and mandible.
Synchondrosis: it is a type of cartilaginous joint in which the connecting material is hyaline cartilage. The most common type synchondrosis is the epiphyseal plate. Such a joint connects the epiphysis and diaphysis of a growing bone. Since the hyaline cartilage is eventually replaced by bone or fibro cartilage when growth ceases the joint is temporary. It is replaced by synostosis or symphysis.
Syndesmosis: It is a type of fibrous joint in which there is considerably more fibrous connective tissue than there is in a suture. As a result, the fit between the bones is not guite as tight. The fibrous connective tissue forms an interosseus membrane or ligaments than permits some degree of flexibility and movement.
Symphysis: It is a type of cartilaginous joint in which the connecting material is a broad, flat disc of fibrocartilage. This kind of joint is located in the intervertebral disc situated between the vertebral bodies. The outer portion of an intervertebral disc is fibrocartilaginous material. The pubic symphysis between the anterior surfaces of the hipbones is another example of the symphysis.
Pivot joints: it is also called as trochoid joint. It's a rounded or pointed surface of one bone articulates with in a ring formed partially by another bone and partly by a ligament. The primary movement permitted is rotation. Where a bone moves in a single plane around its longitudinal axis. The joint is therefore monaxial.

Some of Joints and Its Applied Anatomy:
i). ***Ansa Sandhi*** **(Shoulder Joint):** Applied anatomy: Dislocation, Frozen shoulder, Referred should tip pain.
ii). ***Kurpara Sandhi*** **(Elbow Joint):** Applied anatomy: Dislocation, Frozen shoulder, Tennis elbow, Subluxation of the head of the radius
iii). ***Manibandha Sandhi*** **(Wrist Joint):** Applied anatomy: Commonly involves in RA.
iv). ***Janu Sandhi*** **(Knee Joint):** Applied anatomy: Dislocation, Involve in RA, & OA.
v). ***Vamkshana Sandhi*** **(Hip Joint):** Applied anatomy: Dislocation, Fracture.
vi). ***Gulpha Sandhi*** **(Shoulder Joint):** Applied anatomy: Dislocation, Frozen shoulder, Referred should tip pain.

Conclusion
The study of Arthrology (*Sandhi Sharira*) reflects a classical ayurvedic knowledge with modern anatomical insights, broadening understanding.

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