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PHYSIOLOGICAL, ANATOMICAL AND PATHOLOGICAL ASPECTS OF *SANDHI*: AN AYURVEDA AND MODERN REVIEW

Vd. Sushil Bobade[1] and Vd. Dhairyasheel Yadav[2]

[1]Reader, Sharir Kriya, Pharte Patil Ayurvedic College, Pune, India.

[2]Lecturer, Sharir Rachna, Phartae Patil Ayurvedic College, Pune, India.

Abstract

The meeting point of two or more constructions is defined as the *Sandhi*, modern definitions define a joint as the location where two or more bones articulate. Several *Aacharyas* have specified differing numbers of *Sandhi* in various Ayurveda texts. According to *Aacharya Sushruta*, there are 210 *Sandhis* in all, which are dispersed throughout the body and responsible for the movements inside the body. According to a remark by *Aacharya Sushruta*, only *Asthi Sandhis* should be considered when counting *Sandhis*, despite the fact that there are many *Sandhis* in our bodies that cannot be tallied. It is stated that to diagnose and treat joint problems, one must have a full understanding of the structure and operation of the joint. Hence, understanding the anatomy and physiology of joints is necessary. Considering this aspect present article explains physiological, clinical and pathological aspects of *Sandhi* as per ayurveda and modern view.

Keywords: *Ayurveda, Sandhi Sharira, Asthi, Sandhi, Bones, Joints.*

Introduction

Medical science described joints as body parts which are supported by soft tissues like muscles, ligaments, and tendons. Joints are the intersections of bones; these joints are responsible for the various types of movements of different body parts. Body's bony joints are described as *Sandhi,* body and its parts are studied as *Sharira*. Therefore term "*Sandhi Sharira*" refers to the study of the body's joints (bony joints). In this context, the word "*Sandhi*" refers as junction, union and meeting spot of bones. *Sandhi*, is created whenever two or more bony ends come together. Some theories claim that *Sandhis* are also the point at which any two bodily structures converge. Such *Sandhis* are bound by the power of *Kapha*. However, in general, the term "*Sandhi*" is used to refer only *Asthi-Sandhi* [1-4].

KriyanusarVargeekaran:

- ✓ *Chal (Cheshtayukta Sandhi)*
- ✓ *Achal (Sthira Sandhi)*

The *Sandhis* located in the *Shakhas, Hanu*and *Kati,* etc. are *Cheshtayukta Sandhis*, but the nature of all other *Sandhis* falls within the *Sthira* category. According to the degree of their movement, the *Cheshtayukta Sandhis* are further divided into two categories as depicted in **Figure 1**.

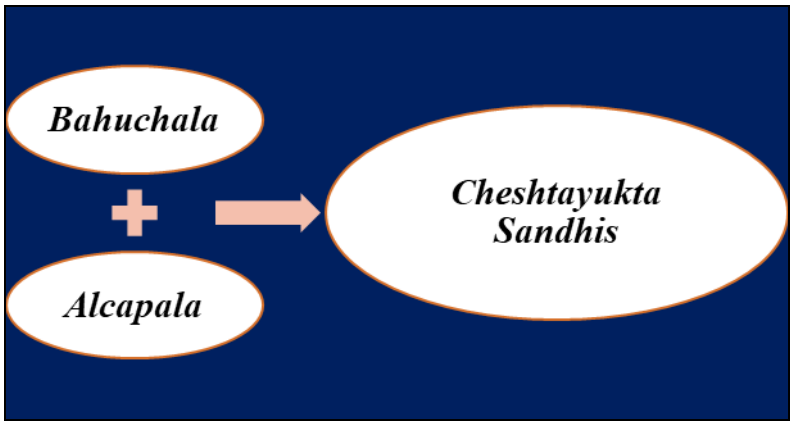

Figure 1: Types of *CheshtayuktaSandhis*

As depicted in Figure 1 the *Bahuchala*and *Alcapala*are two types of *CheshtayuktaSandhis.Bahuchala*means freely movable joints while *AlcapalaSandhis*are

slightly movable.The *Sandhi* of *Hanu,Shakhas* and *KatiPradesha* are come under the heading of *BahuchalaSandhi*, whereas that of *Prushtha* and other places is of the *Alpachala* variety.

*Acharya Sushruta*regularly performed dissections while also attending to patients who had been hurt in fights or wrestling matches or who had various joint problems. He listed eight types, based on how they appeared when moving in a live person and when joint illnesses restricted motion, and he confirmed the appearance once more using dissection. They are *Kora Sandhi,Shankhavarta, Mandala, Ulukhala, Samudga,Pratara, Tunnasevani,* and *Vayastunda* [4-7].

- *Anguli, Manibandha, Gulpha, Janu* and*Kurpara* are the regions where the *Kora Sandhi* is seen.
- *Ulukhala Sandhi* are so named because they resemble the stone grinders that were once used in kitchens. The shoulder joint, hip joint and *Dashana* joints are all of the *Ulukhala kind*.
- *Samudga Sandhi* resembles a box,*Ansapeeth*, *Guda*, *Bhaga* and *Nitamba* exhibit these *SamudgaSandhis*.
- *Pratara Sandhi*resembles gliding or plane joint, this type of joint possesses articulating surfaces, they are flat, floating and supported by cushion. According to *Sushruta*, these joints are situated at the *Greeva*, *Prushthavansha*and *Kasherukha*, etc.
- *Tunnasevani Sandhi*described with articulating surfaces resembling dentate edges that are supported, adhered to, or incorporated into one another,these types of*Sandhi* observed at *Sirakapala* and *Katikapala*.
- *Vayastunda Sandhi*means condylar joint.The *Hanu* that is located within the *Shankhasthi* on both sides of the chin and creates the temporomandibular joint is regarded as *Vayastunda Sandhi*.
- *Mandala Sandhi*are *Sandhi* which are oval or round in shape. *Kantha*, *Hrudaya* and *Netra* all have this sort of *Sandhi*.
- *Hankhavarta Sandhi* are circular in shape and resemble the *Shankha* or the snail's shell. They are located in *Shrotra* and *Shringataka*.

Number of *Sandhi*:

1. There is 200 *Sandhi* in the body, according to *AacharyaCharaka*.
2. *AacharyaSushruta*states that the body is made up of 210 *Sandhis*, 68 are in the four extremities, 59 are in the *Koshtha* and 83 are in the neck and the area above it [6-8].

Physiological Functioning of *Sandhi*:

- Joint ball and socket facilitates rotational movement. The shoulders joint is an example of this kind of joint.
- Pivots joint facilitates movement in both directions.
- Hinge joint allows only backward and forward movement; ankle, elbow and knee joints are examples of hinge joints.
- Snug joints are a biaxial joint that may move in two directions: flexion and extension as well as abduction and adduction.
- Condyloid Joints have two axes and allow for both up-and-down and side-to-side motions.
- Gliding joints enables the unrestricted movement of two or more round or flat bones next to one another without any bone friction or crushing.

MODERN REVIEW

Joints are unions between two or more rigid skeletal components, such as bones. They are built with various levels and styles of movement in mind. Joints are divided into structural categories based on their anatomical features and functional categories based on the types of movements they enable.

Fibrous joints are maintained together by fibrous connective tissue; there is no synovial cavity. Sutures, syndesmoses, and interosseous membranes are the three different forms of fibrous joints. Primary cartilaginous joints and secondary cartilaginous joints are the two categories of cartilaginous joints. Examples include the manubrium sterni, first costal cartilage, pubis symphysis, diaphysis, and epiphysis. Synovial joints stand apart from other joints due to a few traits. The synovial cavity that exists between the articulating bones is the distinguishing feature of a synovial joint. Every synovial joint is categorised

functionally as a diarthrose because the synovial cavity enables a joint to move freely. Articular cartilage, a type of hyaline cartilage, covers the bones at a synovial joint. Although it does not connect the bones, cartilage gives the articulating surface of the bones a smooth, slick surface [9-11].

Pathological Aspects:

1. *Sandigatha vatha* is a *Vatha* predominant condition in which pain is the main feature, this may occur in old age due to *Dhatukshaya.*
2. *Vata raktha* involves symptoms of swelling and dryness, etc.
3. *Kostuka shirsha* is associated with pain and swelling in the knee joint.
4. *Avabahuka* involves symptoms of pain with restriction in movements.
5. *Vatakantaka* is associated with pain at calcanium area.
6. *Grudrasi* involves pain along the hip joint and thigh.
7. *Khalli* is condition which associate with symptoms of paralysis.
8. *Urustambha* is associated with severe pain and loss of temperature sense.
9. *Hanusthamba* is mainly occurs due to trauma and loss of movement observed.
10. *Amavatha* mainly affects bigger joints.
11. *Raktha vatha* cause vitiation of *Rakta dhatu*.
12. *Gulpha graha* is associated with stiffness in the ankle joint.
13. *Griva sthambha* means stiffness in the neck.

Pain, swelling, stiffness, limited range of movement, tenderness, weakness, inability to move the part and fever, etc. are common symptoms of joint diseases.

Conclusion

The meeting point of two constructions is defined as the *Sandhi*, *Aacharyas* have specified differing numbers of *Sandhi* in various Ayurveda texts. There are 210 *Sandhis* in which are dispersed throughout the body and responsible for the movements and extension of body parts. There is 200 *Sandhi* in the body, according to *Aacharya Charaka* while *Aacharya Sushruta* stated 210 *Sandhis* in body. *Sandigatha vatha, Vata raktha, Kostuka shirsha, Kostuka shirsha, Kostuka shirsha, Avabahuka, Vatakantaka, Grudrasi, Amavatha, Raktha vatha* and *Griva sthambha,* etc. are major diseases associated

with joints. Joints are involved in various activities like rotational movement, backward and forward movement, flexion and extension, up-and-down and side-to-side motions and other types of flexible movements in body. Medical science described various types of joints including ball and socket, pivots joint, hinge joint, snug joints and condyloid joints, etc. *Sandhis* are not only responsible for the movement but also provide flexibility in the body.

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