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# Critical review of Anatomy of Knee joint and its Clinical aspects in Osteoarthritis

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## ABSTRACT

The knee joint is the largest and complex joint of the body. In *Sandhigata Vata* the vitiated *Vata* consequences in *Asthi Ksaya*. Osteoarthritis is a slowly progressive degenerative disorder resembles with *Sandhigata Vata* or vatic disorder. This joint is formed between three bones: the femur, tibia, and patella. It allows the lower leg to move relative to the thigh while supporting the body's weight. Osteoarthritis (OA) is a type of joint disease that results from cessation of joint cartilage and underlying bone. This kind of problem starts with some discomfort, a cracking sound, and if not taken care of, results in eventual immobilization of the joints. Because the bone is not getting the nourishment it needs, it starts to degenerate. When this happens, the joints are not lubricated properly and this creates the discomfort, cracking sound, and diminished flexibility like knee joint Osteoarthritis.

**Key words:** *Asthi Ksaya, Sandhigata Vata, Osteoarthritis, Gulpha, Janu, Kurpara.*

## INTRODUCTION

Ayurveda deals with scientific study of the subject *Shareera Rachana* (Human anatomy) in detail. The knee joint is the largest and most complicated joint of the body. It actually consists of three joints. An intermediate patello femoral joint between the patella and the patellar surface of the femur. A lateral tibio-femoral joint between the lateral condyle of the femur, lateral meniscus and lateral condyle of the tibia. A medial tibio-femoral joint between the medial condyle of the femur lateral meniscus and medial

condyle of tibia. The knee joint is one of the strongest and most important joints in the human body. It allows the lower leg to move relative to the thigh while supporting the body's weight. This joint is formed between three bones: the femur, tibia, and patella. The patella lies in front of the femur on the anterior surface of the knee with its smooth joint-forming processes on its posterior surface facing the femur.

Osteoarthritis (OA) is a type of joint disease that results from cessation of joint cartilage and underlying bone. The most common symptoms are joint pain and stiffness. Initially, symptoms may occur only following exercise, but over time may turn into stable. Other symptoms may include joint swelling, decreased range of motion, and when the back is affected weakness or numbness of the arms and legs.

## OBJECTIVES

1. To overview the structural anatomy of knee joint briefly.
2. To study *Sandhigatvat* with reference to Osteoarthritis in knee joint.

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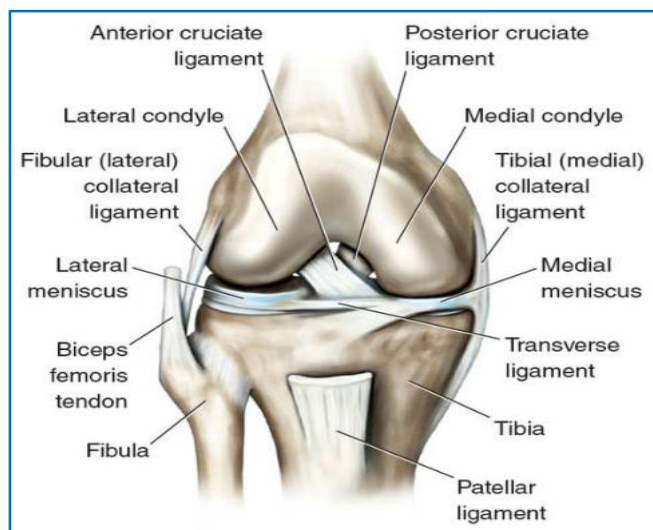
**Concept of Sandhi**

**Sandhi:** Sandhi can be taken as union of two or more bones. This *Sandhi* looks like a flower bud when seen in flexed condition of the joint from a distance that is why; it may be called as *Kora Sandhi*. The *Kora Sandhis* are found in the places *Anguli* (Inter phalengial), *Manibandha* (Wrist), *Gulpha* (Ankle), *Janu* (Knee), and *Kurpara* (Elbow). This is Hinge joint according to modern science.

**Janu Sandhi**

*Janu sandhi* is kora type of Sandhi. Janu means the Knee. *Sandhis* are the junctions of Bones and are seat of *Kapha*; they help to keep the Body parts Together. Janu Sandhi's are 2 in number present in lower extremities.<sup>[1],[2]</sup> Circumference of the middle portion of knee is 14 *Angulas*. Length of *janu* is 4 *Angula* and its circumference is 16 *Angulas*.<sup>[3]</sup>

Knee joint is the largest and more complex joint of Body. Complexity is the result of fusion of 3 joints i. e. Lateral femoro-tibial, medial femoro-tibial and femoro patellar joints.<sup>[4]</sup> It is a type of synovial joint, incorporating two condylar joints between femur and tibia, and one saddle joint between the femur and the patella. The articular surfaces are condyles of femur tibia and patella.

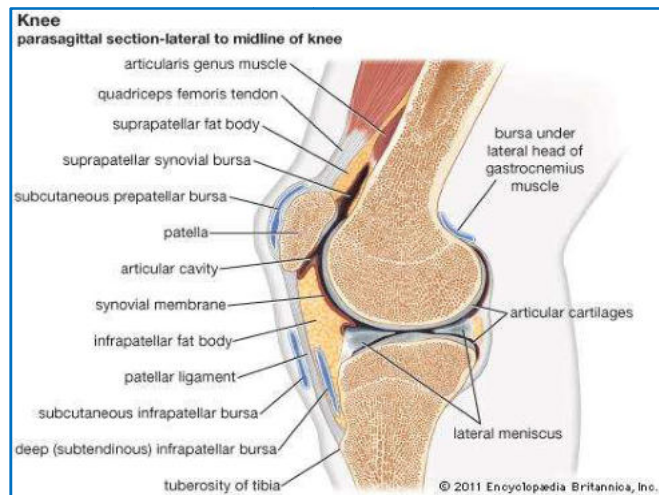


**Fig. 1: Structure of Knee joint (Bones & Ligament)**

The anatomical components of the knee joint are as follow;

1. Articular capsule

2. The medial and lateral patellar retinacula
3. Oblique popliteal ligament
4. Arcuate popliteal ligament
5. Tibial collateral ligament
6. Fibular collateral ligament
7. Intracapsular ligaments (anterior cruciate ligament & posterior cruciate ligament)
8. Articular discs (menisci)
  - a. Medial Meniscus.
  - b. Lateral Meniscus
9. Patellar ligament
10. Prepatellar bursa, infrapatellar bursa and supra patellar bursa.
11. Common peroneal and tibial nerve.
12. Popliteal artery
13. Popliteal vein.



**Fig. 2: Structure of Knee joint (Ligaments & Muscles)**

**Sandhigata Vata**

*Sandhigata vata* has its origin from a combination of three words *Sandhi*, *Gata* and *Vata*. In *Sandhigata Vata* the vitiated *Vata* consequences in *Asthi Ksaya*. *Vata*, based on *sthana* and karma reaches five different names viz. *Prana*, *Udana*, *Samana*, *Vyana*, *Apana*. *Vyana Vayu* is said to be '*Krutsna Deha Chara*' i.e., it moves all over the body. However, based on its function of *gati* or movement it can be considered

that *Sandhi* is one of its sites. *Sandhivata* is a most common pathological condition in current clinical practice especially in *jaravastha* (old age) and is enumerated under the heading of *Vatavyadhi*.

#### **Nidana panchaka of Sandhigatavata<sup>[5]</sup>**

*Sandhigata Vata* which occurs due to the *Kopa* of *Vata Dosha* and as all the classics of Ayurveda describes “*Sandhigata-vata*” under *Vatavyadhi Chikitsa Adhayaya*. So brief descriptions about the *Nidana Panchaka* in relation with *Vatavyadhi* is narrated here as under.

“*Ruksha Sheetalpa.....Sarbeiekanga Samsritan*”

#### **Rupa<sup>[6],[7]</sup>**

***Sandhishula*** : *Shula* is the chief symptom of *Prakupita Vata*. In case of *Vata* situated in *Sandhi* gives rise to *Sandhi Shula*.

***Sandhishotha*** : *Dosha Sanchaya* in specific site is the main causative factor for *Shotha*. *Vatapurna Druti Sparsha* type of *Shotha* has been described by *Acharya Charaka*.

***Hanti Sandhi Gatah*** : First *Sushruta* explains this symptom followed by *Madhavakar*. *Gati* is unique feature of *Vata* and in *Sandhigatavata* this *Gati* is obstructed because of *Sanga* type of *Srotodusti*. This gives rise to *Stambha*. *Vata* also increased *Shita guna* which is responsible for *sthambha*.

***Akunchana Prasaranayoh Vedana*** : *Prakupita Vata* gets located in *Sandhi*, it hampers the normal function of *Sandhi* which results in *Vedana* during *Akunchana* and *Prasarana*.

***Sandhisphutana*** : It is resembling with the crepitation as like osteoarthritis in modern science.

#### **Samprapti<sup>[8],[9]</sup>**

*Acharya Charaka* has mentioned that *Nidana Sevana* aggravates *Vata* and this *Prakupita Vata* gets accumulated in *Rikta Srotas* and gives rise to various generalized and localized diseases. No specific *Samprapti* has been explained for *Sandhigata Vata*. So, it can be said that *Samprapti of Sandhigata Vata* is same as that of general *Samprapti of Vatavyadhi*.

The *Vata Dosha* is aggravated due to different factors and *Vata* flows out of its *Ashaya* to circulate in the entire body and its constituents. During circulation it gets localized in the roots of *Majjavaha Srotas*. i.e. *Asthi Sandhi*. In the *Asthi* and *Majjavaha Srotas*, the *Khavaigunya* may already present *Guru*, *Snigdha* and *Mridu*. When aggravated *Vata* gets localized in *Sandhi*, it over powers and un does all qualities of *Kapha*. The chief task of *Kapha* is to sustain or *Dharana*. This chief aim of *Kapha* is destroyed by the influence of aggravated *Vata*. When aggravated *Vata* is localized into a single joint, the disease will be reflected in only one Joint but if *Vata* is present in many joints, the disease may be presented by multiple joint involvements.

#### **DISCUSSION**

*Sandhigata Vata* is the common form of articular disorder one of the types of *Vatavyadhi* which mainly occurs in *Vridhdhavastha* due to *Dhatukshaya*, which limits everyday activities such as walking, running, bathing and hampers quality of life. Osteoarthritis (OA), is generally considered as degenerative joint disease,’ and it is the most common form of Arthritis. It can be corelated with *Sandhigata Vata*, it is *Madhyama Roga Margagata Vatika* disorders in which vitiated *Vata* gets lodged in *Sandhi*. This vitiated *Vata* results in *Asthi Ksaya* (decay in bone). *Vata*, based on *sthana* and *karma* attains five different names viz. *Prana*, *Udana*, *Samana*, *Vyana*, *Apana*. *Vyana Vayu* is said to be *krutsna deha charah* i.e., it moves all over the body. However, based on its function of *gati* or movement it can be considered that *Sandhi* is one of its sites. Each *Sandhi* is also composited from *Panchamahabhutas*. All joints in the body are tied with many ligaments by which persons are capable of bearing load. *Janu marma* situated in the lower extremity and forms junction of femur and tibia bone. It is one of the *sandhi marma*.<sup>[10]</sup> The *Sleshma* that resides in *Sandhi* is named as *Shlesaka Kapha*. It facilitates free Movements of the *Sandhi* and lubricates it as well. However, in Osteoarthritis it reduces and increases friction between two bones results into inflammation and pain which affects structure of knee joints, even it yields in osteophytes



in patella which may further restrict joint moment as well as induce pain.

### CONCLUSION

*Sandhigata Vata* is the common form of articular disorder commonly infected Knee joints mainly occurs in Vriddhavastha due to Dhatukshaya as a *Vatavyadhi*, Osteoarthritis or Degenerative Joint Disease may appear without symptoms in adulthood also if not proper care of joints. It can be diagnosed clinically as well as radiological investigations. *Sandhigata Vata* correlated with osteoarthritis (OA) of the knee joint is chronic, degenerative, inflammatory disease which has a excessive impact on the quality of the life of an individual.

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