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LITERARY REVIEW OF SANDHIGATA VATA AND ITS TREATMENT WITH REFERENCE TO OSTEOARTHRITIS

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ABSTRACT

Sandhigata Vata is a degenerative joint disorder. Lifestyle plays a very important role in *sandhigatavata*. It comes under *Vata Vyadhi* mentioned in Ayurvedic classic. This disease mainly gets aggravated in old age as all the *dhatu* undergoes *kshaya* and which lead to the aggravation of *vata*. As *sandhigatavata* is common in old age it is also prevalent in younger generation. The main signs and symptoms of this disease is pain (*shula),vatapurnadritisparsha* (swelling), *atopa* and *sandhihanti etc*. Osteoarthritis of the knee joint which is almost identical to *Sandhigata Vata* described in Ayurveda with respect to etiology, pathology and clinical features. It generally limits the activity of the day today life such as walking, bathing, dressing etc. By taking treatment with modern medicine like analgesic, steroid etc, which gives relieve for a limited time period, but continuous using of such medicine have adverse effect and extremely hazardous. For the purpose of prevention and cure various medicine are mentioned in Ayurvedic classic which serves a healthy life.

Keywords: *Sandhigatavata,* Degenerative Joint Disorder, Osteoarthritis

INTRODUCTION

Sandhigatavata is one which comes under *vatavyadhi* mentioned in Ayurvedic classic characterized by the symptoms such as *sandhisula, sandhisopha* (swelling of joint), *sandhihanti, atopa* etc. According to modern, osteoarthritis is a degenerative disorder which affects the articular cartilage of joint. Osteoarthritis of the knee joints comes under inflammatory group which is almost identical to *sandhigatavata.*

It generally begins asymptomatically in 2nd and 3rd decades of life. 90%of people have radiographic feature in the weight bearing joint mainly the knee joint by the age of 40. Some other major joined are also involved like shoulder hip etc. In present era, due to life style modification, change in dietary habit, urbanization, excessive travelling, redundant exercise like over walking, improper sleep and work and all these

lead to vitiation of *vatadosha* and which lead to *kshaya* of *dhatu*. It is the most common form of osteo arthritis, and becoming the leading cause of pain and disability worldwide.

It generally limits the activity of the people in day to-day life. The prevalence of osteoarthritis generally increases with age. Many researches were conducted on this disease still complete cure of these is a mirage.

INCIDENCE

The age standardized prevalence of radiographic knee OA in adult age > 45 was 19.2% among the participants in the Framingham study and 27.8% in the Jhonston county osteoarthritis project. In the third national health and nutrition examination survey, approximately 37% of participants age >60 years or older had radiographic knee OA. Age standardized prevalence of radiographic hand OA was 27.2%. Radiographic hip OA was less common than hand or knee. The age prevalence of symptomatic hand and knee OA is 6.8% or 4.9% respectively in Framingham subject age >26 year[1].

Definition of Sandhi

"Sandhayahcha anga sandhanat dehe prokta kaphanitta

Asthyanam tu sandhayo hi etah kabalaha parikirtitah"(Sha.Pu. 5/56)

It means Joint, the place where two body parts joins with the help of *Kapha*.[2]

According to Sushrut, in general for the purpose of understanding, only *asthi-sandhi* or bony joint are considered under the term *sandhi* or *sandhis*. Other joints like joint between pesi (muscles), blood vessels, snayu (ligament), *sira* (vein) etc, are innumerable and are usually not considered for counting and description.[3]

CLASSIFICATION OF SANDHI

According to Sushrut it is classified as-

1. Kriya (Movement)
2. Racananusar (Shape)

Based on the movement, Susruta Samhita has divided the *Sandhi* into following two types-[4]

A) *Chestavanta sandhi* (joints with movements)

Chestavanta sandhi is present in *sakha* (upper and lower limb), *hanu* (temporomandibular joint) and *kati* (hip).

B) *Sthira sandhi* (joints with no movements)

All the other remaining i.e. the cranial sutures, intervertebral, costovertebral, sternovertebral belong to *sthira sandhis* (immovable or slightly movable joints).

The movable *sandhis* are classified again into

- *Bahucala* (freely movable)
- *Isatcala* (slightly movable)

According to the anatomical structure: [4]

They are of eight varieties -

a. *Kora* (hinge joint) –It is found in *anguli, manibandha, kurura, janu, gulpha.*

b. *Ulukhala* (Ball & Socket joint) -It is found in *kakshya, bankshana, danta*.

c. *Samudga* (Cavity joint) - It is found in *guda, angsapeeth, bhaga, nitambha.*

d. *Pratara* –It is found in *griva*, *pristabangsha*.

e. *Tunnasevani* (sutures) –It is found in *sira, kati*.

f. *Vayasatunda* – It is found in *hanu*.

g. *Mandala* (annular joint) -It is found in *kantha, hriday, netra, kloma.*

h. *Sankhavarta* e.g. *Sroth, Sringatak*.

Bhavamisra classifies the joints in the same manner. *Tunnasevani* is replaced by *Tunasevani* and *Vyasatunda* is replaced by *Kakatunda*.

Acharya Sushruta has considered Sandhi as one of the five types of Marma[4]. The *Janu, Kurpara, Gulpha*, *Manibandha* are considered as *Sandhi Marma*. Among these, *Janu* and *Kurpara* belong to *Vaikalyakara* group of *Marma. Gulpha* and *Manibandha* belong to *Rujakara* group of *Marma*. Naturally and specifically, *marma* forms the seat of *Prana*.

According to the occurrence of disease, there are three *Roga Margas*. *Asthi Sandhi* is one of the components of *Madhyamarogamarga*. Chakrapani explains that this division of *Rogamarga* is helpful to assess *Sadhya-Asadhyata* of disease. The diseases which are located in *Marma* and *Sandhi* are regarded as Yapya.[5]

To form a *Sandhi*, apart from two or more asthis other structures are also required which connect the asthis to

one another, to maintain, stabilize, bear weight and to facilitate the gati in them.

Structures that constitute a *sandhi* are: *Asthi, Snayu, Slesma dahra kala, Slesma, Pesi, Sira, Dhamani.*

AETIOLOGY:

- Usually associated with aging. It occurs above 50 or 60 years of age.
- Genetic factors: the gene we inherit can affect the likelihood of getting osteoarthritis at the hands, knees or hip. Some very rare form of osteoarthritis was linked to mutation of single gene that affects a protein called collagen.
- The real cause is abnormal stress and strain on the joints associated with loss of mucopolysaccharide contents of matrix of the articular cartilage. Obesity, endocrinopathy (acromegaly) or genetic factors are also responsible.

NIDANA: According to Ayurveda[6]

As *Sandhigatavata* is under *Vatavyadhi*, the aggravating factors of *Vata* can be adopted as *nidana* of *Janusandhigatavata*.

Common *Hetus* of *Vatavyadhi*, as mentioned by Acharya Charaka are as below.

- ***Aharaja*****:** *Atiruksha, Atishita, Atialpa, Atilaghu, Abhojan*
- ***Viharaja*****:** *Ativyavaya* (Excessive sexual indulgences), *Atiprajagaran* (remaining awake at night), *Plavana* (swimming), *Atiadhva* (excessive walking), *Ativyayam* (excessive physical exercise), *Vichesta* (inappropriate physical activities), sleeping and sitting over uncomfortable seats, *Divasvapna* (sleeping during day), *Vegasandharan* (suppression of natural urges), *Gajostraaswasi-ghrayangamana* (riding over elephant, camel, horse or fast moving vehicle) etc
- ***Manas*****:** *Atichinta, Atishoka, Atikrodha, Atibhaya* (excessive worry, grief, anger, fear)
- ***Others*****:** *Langhan* (fasting), *Ama, Vishamad Upacharad* (inappropriate therapeutic measures), loss of *dhatus* etc

CLASSIFICATION OF OSTEOARTHRITIS (https://www.cigna.com)

Osteoarthritis is classified as-

1. Primary osteoarthritis
2. Secondary osteoarthritis

1. Idiopathic (primary)

Thus, in idiopathic (primary) OA the change is commonly held to be related to deterioration of the articular cartilage of the affected joint, occurring as a result of biological ageing. With aging, the water content of the cartilage increases and the protein makeup of cartilage degenerate. The deterioration of cartilage may have its basis in alterations relating to the rate of production and chemical composition of the matrix of the cartilage.

2. Secondary OA

- Due to mechanical incongruity of joint.
- Due to prior inflammatory diseases (e.g. rheumatoid arthritis)
- Due to metabolic disorders (e.g. calcium pyrophosphate dehydrate crystals, hemochromatosis)
- Due to endocrinal disorders (e.g., diabetes, acromegaly)
- Congenital development
- Miscellaneous (e.g.avascular necrosis)

RISK FACTOR OF OSTEOARTHRITIS (https://www.cdc.gov)

MODIFIABLE RISK FACTORS:

1. Excess body mass index (especially in knee OA)
2. Joint injury (sports or work trauma)
3. Occupation (due to excessive mechanical stress, hard labour, heavy weight lifting, knee bending).

NON-MODIFIABLE RISK FACTORS:

1. Gender-women are at high risk. Menopause in women is the risk factor for developing OA in women. In females, sex steroids decreases up to a great extent immediately after menopause.
2. Age –Risk increases with age. In old age sex steroids decreases which leads increase bone resorption. Estrogen influences bone loss either directly by binding to the bone receptor or indirectly by influencing calcium regulatory hormones (parathyroid hormone (PTH) and vitamin

D) and cytokines interleukin (IL-1) and interleukin (IL6)
- Bone mass decreases due to demineralization.
- Bone becomes brittle due to decreased protein synthesis.
- Turned off of cyclin-D1 gene, due to which cartilage cells are unable to rebuild cartilage.
- Tensile strength, fracture resistance and fatigue strength deteriorate (loss of elasticity).
- Decreased cellularity of cartilage.
- Overall metabolic activity decreases.
- Cartilage degeneration

3. Race (some Asians have lower risks)
4. Family history
5. Bone mineral density. Studies have showed that high bone mineral density or increase in bone mineral density appears to be associated with the risk of developing of knee OA.
6. Congenital joint anomaly.

SYMPTOM:[7,8]

Aggravation of vayu gives rise to following signs and symptom-.

1) *Vatapurnadhrutisparsha* (Inflammed knee joint)
2) *Sandhisula* (Pain in joint)
3) *Vedana* during *akunchan* and *prasarana* (Pain during extension & flexion)
4) *Sandhi hanti*
5) *Atopa*

SAMPRAPTI

*Sandhi i*s the site of *shleshakkapha*. As age increase, *vatadosha* in body also increases and *kapha* specifically *shleshakakapha* decrease hence joint become less functional as vitiated *vata* get lodged in sandhi.[9]

Acharya Charaka has mentioned that, due to above mentioned *nidanasevana vata* which gets aggravated and filled up the channel of circulation which are empty or weak in quality due to lack of unctuousness etc produce different kind of ailments affecting the whole body or o part of the body.[10]

SAMPRAPTI GHATAK

1. *Dosha - Vatavriddhi* and *Sleshakkaphakshaya*
2. *Dushya -* S*nayu, sleshmadharakala*
3. *Srotas - Asthivahasrotas*
4. *SrotaDustiprakara - Sanga,vimargagamana*
5. *Agni – Visamagni*
6. *Rogamarga - Madhyam*
7. *Adhisthana - AsthiSandhi*
8. *SadhyaAsadhyata -kricchasadhya, yapya.*

DIFFERENIAL DIAGNOSIS

Some of the diseases which resemble *Janusandhigatavata* are mentioned below along with the comparative studies of symptoms-

Table 1:

Factors	***Sandhigatavata***	***Amavata***	***Vatarakta***	***Koshtrushirsha***	***Asthimajjagatavata***
Ama	Absent	Present	Absent	Absent	Absent
Jwara	Absent	Present	Absent	Absent	Absent
Hridgaurava	Absent	Present	Absent	Absent	Absent
Age	Old age	Any age			
Vedana	*Prasarana Akunchan Pravrutti*	*Vrischik Danshavata Sanchari*	*Mushik Danshavata Vedana*	*Tivra*	Toda
Sotha	*Vatapurna Drutisparsha*	*Sarvanga*	*MandalYukta*	*KoshtrukaShirshvat*	
Sandhi	Big and weight bearing joints	Big joint	Small joint	Only *Janu* (Knee)	Big & Small Joint

DIFFERENTIAL DIAGNOSIS OF OSTEOARTHRITIS:[11]

Differential Diagnosis of Osteoarthritis

1. Rheumatic arthritis- here big joint are involved one after another, tonsils are inflamed, evidence of carditis are present, joint manifestation subside without any deformity. Anti streptolysin O titre in the blood is increased.
2. Traumatic arthritis: History of trauma will be present. Usually single joint is affected.
3. Tubercular arthritis: Single joint is involved. Wasting of muscles above and below the involved joint is very common, low grade pyrexia, emaciation, anorexia, etc., are seen Evidence of TB may be present in the chest. X-ray of chest may reveal tuberculosis.
4. Psoriatic arthritis: It is monoarticular, the skin becomes red, oedematous, glossy and tender with local rise of temperature. Blood shows leucocytosis with increased polymorph, joint fluid show pus.
5. Rheumatoid arthritis: It is a chronic systemic inflammatory disease of joint of unknown cause characterized by symmetrical relapsing ankylosing polyarthritis affecting mainly the peripheral small joint initially, associated with varied constitutional symptom and presence of rheumatoid factor.

CHIKITSA OF SANDHIGATAVATA

Sandhigatavata should be planned by taking into consideration of factors as *doshic* involvement, vitiated *dhatu*.

In case of *dhatukshaya* (degenerative changes), treatment should be given for *santarpana* and *dhatuposhana* (nutrition).

- In case of *margavarodhajanya* (obstructed pathology) one has to treat vitiated *kapha* and *meda* and then to *vatadosha*. *Snehana* and *abhyanga* is contraindicated in initial stage.
- According to Charak "*Vighatana* of *Samprapti*" is the *chikitsa*. *Sandhigatavata* is a *vatika* disease, mainly occurring due to *Dhatukshaya* or *Avarana*, so, general treatment of *vatavyadhi* like *snehan, swedan, mriduvirechan, niruha basti, vataharaausadhis, ahar* and *vihar etc* can be adopted considering its etiology .[12]
- Acharya Charak has mentioned in *vatavyadhichikitsa about* the *Brimhana* measures in different forms like *bhojana, snigdhasweda, seka, basti* etc. are beneficial for the patients suffering from *vatarogas*
- All the Acharyas gives prime importance to *Snehanachikitsa* in the management of *Sandhigatavata. Snehana* can be performed both *Bahya* and *Abhyantara. Bahya Sneha* include - *Abhyanga, tarpana, Murdhataila* etc., and *Abhyantara Sneha* include *Bhojana, pana, nashya* and *Basti*.

1) Sushruta has explained the specific line of treatment of *sandhigatavata* as *snehana*, *upanaha, agnikarma, bandhana* and *mardana*.[13]

- In Chakradutta and Bhaishjya Ratnavalli there is mention of *vataharaganas*. Chakradutta mentioned drugs like- *Aswagandha*, *Bala, Dasamoola, Sunthi, Rasna* etc. And Bhaishjya Ratnavalli mentioned - *Nirgundi, Guggulu, Gandhaprasarani, Rasna*, *Bala, Shigru* etc.
- Vagbhata has mentioned *snehan, daha* and *upanaha* if *vayu* get aggravated in *snayu, sandhi* and *sira*[14]
- According to Vagbhata after using *snehan* and *swedan* in whole body, the person who is suffering from *harsa, toda, ruka, Aayam, sujan, jakaran, graha* etc get relieved and which bring lightness to the body.[14]

MANAGEMENT:[15]

Goals of managing OA include

The management of OA is broadly divided into –

- Non-**pharmacological**
- Pharmacological, and
- Surgical treatment

Non-Pharmacological Treatment

- Education
- Social support
- Physiotherapy (aerobic exercise, muscles strengthening, and patellar strapping)
- Occupational therapy
- Acupuncture
- Transcutaneous electrical nerve stimulation
- Maintain an acceptable body weight

- Improve joint care (through rest and exercise)

PHARMACOLOGICAL TREATMENT

- Simple analgesia
- NSAID
- Cox-2 inhibitor(cyclo-oxygenase-2 selective non-steroidal anti-inflammatory drugs)
- Topical(non-steroidal, anti-inflammatory drugs, capsaicin)
- Chondroprotective agents

INTRA ARTICULAR TREATMENT

- Corticosteroid
- Hyaluronans
- Tidal irrigation

Treatment according to the stages of the disease:

Early

- To relieve pain- analgesics and anti inflammatory drug, heat etc.
- To increase movement-exercise program
- To reduce load- weight loss, avoid stress (jogging etc.)

I**ntermediate**- Realignment osteotomy

Late - Reconstructive surgery

- Arthrodesis
- Arthroplasty

Radiological examination:

The diagnosis of osteoarthritis is mainly radiological.

The plain X-ray of the affected joint reveals –

- Cartilage doesn't show up on X-ray image, but cartilage loss is revealed by Narrowing of joint space between the bones of the joint e.g., may be limited to the medial compartment of tibio-femoral compartment of the knee.
- Subchondral sclerosis: dense bone under the articular surface.
- Subchondral cysts.
- Bony spurs around the joint.
- Magnetic resonance imaging: An MRI uses radio waves and a strong magnetic field to produce detailed image of bone and soft tissues, including cartilage.

Other investigations are primarily to detect an underlying cause.

These are as follows

- Serological tests and ESR to rule out Rheumatoid arthritis. OA does not trigger the acute phase response and therefore has no impact on FBC, ESR, or CRP.
- Serum uric acid to rule out gout.
- Arthroscopy if a loose body or frayed meniscus is suspected.
- Synovial fluid shows presence of calcium Hydroxyapatite crystals or rarely pyrophosphate crystals.

If there is pyrophosphate deposition the calcification is linear and if hydroxyapatite crystals are deposited it becomes spotty.

- Joint fluid analysis- here a needle is used to draw fluid from an affected joint. The fluid is then tested for inflammation and to determine whether the pain is caused by gout or an infection rather than osteoarthritis.

COMPLICATIONS: http://www.healthline.com, http://myhealth.alberta.ca

- Chondrolysis: Rapid complete breakdown of cartilage resulting in loose tissue material in the joint.
- Osteonecrosis: Bone death which may require surgery to remove the affected part of the bone.
- Joint deformity, subluxation, Remodeling and hypertrophy of bone are major features of OA. Growth of cartilage and bone at the joint margins leads to osteophytes, which alter the contour of the joint. subluxations and deformity result from lost cartilage volume, subchondral bone collapse, osteophytes, muscle atrophy and pseudocysts.
- Pinched nerve can occur, especially in OA of spine
- Gout generally developed in OA if there is high urate level in blood.
- Intraarticular cartilaginous and osseous bodies (Joint mice)

Other complications include, Social limitations, Depression, Fatigue, Stress, Anxiety limits on daily activities.

Role of Lifestyle Modification Including Proper Diet Habbit of Osteoarthritis (http://www.healthline.com)

Beside the treatment mentioned above some things which are more beneficial in OA, these are as below:

- Dietary antioxidants, including vitamin A,C,E which provides pain relief and may help in regeneration of cartilage.
- Vitamin B_9 and B_{12} which reduces inflammation and pain.
- Vitamin D is required for proper bone mineralization and cell differentiation and it helps in the absorption of calcium.
- Calcium is required for healthy bone structure.
- Omega-3 fatty acids form fish oil which reduces degradative and inflammatory aspects of chondrocyte metabolism.

Exercise:

Exercise plays very important role in the management of Osteoarthritis.

Not exercising can make joints more painful and stiff, not exercising means muscles will become weaker, making bones more prone to breaking.

Exercise makes muscle and joint healthy. It should be done little and often because, intermittent load and motion are essential for cartilage nutrition.

1. *Range of Motion Exercises:* Which relieve stiffness and increase ability to move joints through their full range of motion.
2. *Strengthening Exercises*: It helps to build strong muscles that give support and protection to joints. Weight training is an example of a strengthening exercise that helps to maintain current muscle strength or increase it.
3. *Aerobic Exercise/Endurance Exercises*: It improves overall fitness, cardiovascular health, control body weight and give more stamina. Examples of aerobic exercises that are easier on joints include walking, riding a bike, swimming etc.

DISCUSSION

Sandhigatavata is described under *Vatavyadhi* in all *Samhita* and *Sangrahagrantha.*

Various *vata Prakopaka Nidanas* like *Aharaja, Viharaja, Manasa* and others are mentioned in details for the occurrence of *Vatavyadhi. Sandhigatavata* is a disease which usually occurs in *Vriddhavastha* in which *Dhatukshya* takes place and it leads to *Vataprakopa*. *Vata* and *Asthi* have *Ashraya-Ashrayi Sambandha* which means *Vata* is situated in *Asthi*. Increase in *Vata* diminishes *Sneha* from *Asthidhatu* due to its *viparita gunas* (opposite qualities) to *Sneha*. So, in *Janusandhigatavata, snehadigunashoonya* is present apart from *sleshakakaphakshaya* (lack of synovial fluid) in the *Asthi* which is responsible for the production of *Sandhigatavata.*

In the Ayurvedic classics, *Janusandhigatavata* is characterized by *sandhishoola, sandhisotha, prasaranaakunchanapravruttivedana, hantisandhi* and *atopa* which can be correlated with osteoarthritis of knee joint in modern medical science.

Osteoarthritis is the most common form of arthritis. This degenerative joint disease results as a consequence of articular cartilage failure induced by multifactorial etiology. The risk factors of osteoarthritis are old age, obesity, female sex, major joint trauma, repetitive stress, genetic factors, prior inflammatory joint diseases and metabolic or endocrine disorders.

In the *Samprapti* of *Sandhigatavata, Vata* gets aggravated due to *dhatukshaya* and flows out of its *ashaya* to circulate in the whole body. It gets localized in the *Janusandhi* where *Khavaigunya* is already present; because until and unless there is *khavaigunya* in the *srotas*, the *dosha* will not take *ashraya*. The qualities of *Vata* like *ruksha, laghu, sukshma, khara* and *vishada* are exactly opposite to the qualities of *sleshakakapha* present in the *sandhi* i.e. *guru, snigdha, sheeta, picchila and mridu*. When *Dushya Sammucchana Dosha* takes place in *AsthiSandhi*, the aggravated *vata* over powers and undoes the qualities of *kapha* which leads to *sandhigatavata.* The function of *kapha* is to sustain or *dharana* which gets destroyed by the aggravated *vata*.

CONCLUSION

In the Ayurvedic classics, *sandhigatavata* is characterized by *sandhishoola*, *sandhisotha*, *prasaranaakunchanapravruttivedana*, *hantisandhi* and *atopa* which can be correlated with osteoarthritis of knee joint in modern medical science.

Osteoarthritis or osteo-arthrosis is a chronic degenerative disease in which all structures of the joint have undergone pathologic changes. The pathologic sinequa none of disease is articular hyaline cartilage loss, present in a focal and initially, nonuniform manner.

As we know it is a degenerative disorder in early age group which hampers quality of life.

In conventional system of medicine, analgesics including NSAIDs, anti-inflammatory drugs, and corticosteroid and intra articular injection are the options for the treatment of Osteoarthritis which gives temporary relief and lastly knee replacement has been done which is quite expensive and may have severe adverse effect. In Ayurvedic classic our Acharya has given thousand of medication for *sandhigatavata* (osteoarthritis) which could subside all the sign and symptom and the patient could perform their routine work with less effort.

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