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Review Article

VIEW OF BASIC TENETS OF *JANUSANDHIGATAVATA* W.S.R. TO KNEE OSTEOARTHRITIS AND ASSESSMENT OF PHARMACOLOGICAL ACTIONS OF *SHADANGA GUGGULU* - A CLASSICAL AND CONTEMPORARY OVERVIEW

Nawale Darshana Subhash[1]*, Wagh Suryakiran Parshuram[2]
*[1]PG Scholar, [2]Professor and HOD, Department of Kayachikitsa, Yashwanta Ayurvedic College PGT and RC, Kodoli, Kolhapur, Maharashtra, India.

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ABSTRACT

Today in modern lifestyle, everybody lives in the calculative manner of me. Improper food habits, consumption of fast-food, late-night work parties, irregular timing and duration of the workout, suppression of natural urges, excessive travelling, continuous work in one posture, improper sitting, mental stress, depression, serve as causes for vitiation of a *Doshas*, especially *Vata dosha* leading to formation of various diseases (*Nanatmaja Vata vyadhi*). *Acharya Charaka* has described the disease *Sandhigata anila* under *Vatavyadhi chikitsa* chapter. The word *Sandhi* means joint, *Gata* means site and *Vata* means moving biological energy. When the vitiated *Vata* localizes at the site of *Sandhi,* it is termed as *Sandhigata vata*. It is a kind of articular degenerative disorders that affect any joints but generally observed in weight bearing joints. When it affects knee joint it is termed as *Janusandhigata vata* which on basis of clinical features can be correlated with osteoarthritis of knee joint. Ayurveda system of health care emphasizes on *Ahara* (diet), *Vihara* (physical activities) as foremost measures in treating any disease followed with *Sanshaman, Samshodhana* or *Shalya karma*. *Guggulu* formulations are indispensable in *Vatavyadhi* due to the ability to address the root cause (*Vata* imbalance) and symptoms (pain, inflammation, degeneration) through multipronged actions, from detoxification to rejuvenation hence validated by both tradition and contemporary science. Current study seeks to build a bridge between two knowledge systems potentially enriching understanding of knee osteoarthritis pathogenesis and key role of *Shadanga guggulu* in its management by assessing pharmacological actions.

INTRODUCTION

Janu sandhigata Vata is a classical *Vatavyadhi* described in Ayurvedic compendia, wherein due to *Dhatukshaya* or *Marga-avrodha* predominantly *Vata dosha* vitiates and localizes in *Janu sandhi* producing a spectrum of degenerative joint manifestations involving *Asthi-Majja kshaya, Upasthikshaya, Sleshakkapha vikruti, Ama sanchaya, Strotorodha*, producing characteristic *Lakshanas* such as *Sandhishula, Sandhishotha*, *Sandhigraha, Atopa, Aakunchan prasaranjanya vedana, Vatapurna Druti sparsha*, leading to functional impairment of knee joint.[1]

In contemporary biomedical parlance the disease exhibits close resemblance to knee osteoarthritis a progressive degenerative disorder with manifestations involving cartilage defect, surface irregularity, impaired joint lubrication and nourishment, altered bio mechanics, subchondrial bone sclerosis, cyst formation, bone marrow lesions, synovitis, producing signs and symptoms such as Pain, swelling, stiffness, crepitus, reduce range of motion making daily activities difficult. [2] [3] [4]

Osteoarthritis is fourth leading cause of disability worldwide with prevalence of 28.7% in India and major risk factors associated are age (>40 years), females, obesity, occupation work, physical labour. [5] Numerous studies have established that the primary

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mechanism behind the inflammatory response are intimately linked to the formation of free radicals and the establishment of oxidative stress. [6] Notably oxidative stress has a role in OA development. [7] The majority of current treatments for OA include intra articular injection, oral drugs, physical alternative and surgical measures. [8] Numerous medications have been shown to be useful in elevating pain in people with OA including analgesics such as non-steroidal anti-inflammatory medicines, corticosteroids such as glucocorticoids, hyaluronic acid and local anaesthetics. [9][10] However its clinical applicability has been limited due to adverse effects and expensiveness.

Disease can be better prevented or cured by the treatment modalities mentioned in Ayurvedic classics that emphasizes on *Vata shamana, Bruhana* and *Rasayana*. Many *Guggulu* formulations have been mentioned in classical texts under *Vatavyadhi* chapter. *Shadanga guggulu* mentioned in *Rasa Ratna Samuchhaya* possesses properties capable for *Strotoshodhana, Anulomana, Deepana, Pachana, Rasayana, Balya* and *Vatasanshaman* essential in treatment of *Janusandhigata Vata*.

AIMS AND OBJECTIVES

1. To Analyse *Samprapti* (etiopathogenesis) of *Janusandhigata Vata.*
2. To Analyse pharmacological actions of *Shadanga Guggulu* in context of *Janusandhigata Vata.*

MATERIALS AND METHODS

Existing literature including, *Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya Samhita*, *Rasaratna Samucchaya, Chakradutta*, *Nighantus, Bhaishajya Ratnavali* and other pertinent current books are all reviewed.

Published Articles related *to Janusandhigatavata*, Knee Osteoarthritis, *Shadanga Guggulu* drugs and Internet sources (PubMed, Google Scholar, MEDLINE, Ayurlog etc) are reviewed.

OBSERVATIONS

In Ayurveda *Samprapti Vighatana* (breaking the pathogenesis) is the core of *Chikitsa* (treatment), aimimg to halt disease progression by disrupting its step-by-step development. It reveals the specific *Dosha, Dushya, Srotas* involved, guiding the physician to target the disease's root, prevent progression *(Kriyakal* stages) and tailor lifestyle/dietary changes making treatment effective, personalized and successful.[11][12] *Janusandhigata Vata* no particular *Samprapti* has been explained. Thus, it may be concluded that *Samprapti* of *Vatavyadhi* and *Samprapti* of *Janusandhigata vata* are the same. Vitiation of *Vata dosha* is utmost important event for manifestation of *Vatavyadhi*. *Riktastrotas* or *Strotorodha* or both can be responsible for *Vata dosha* vitiation.

Based upon above*, Samprapti* can be *Dhatukshayjanya* or *Marga-avrodhajanya* or both ways.[13]

1. *Dhatukshayjanya Samprapti /Nirupastambhita samprapti*

It mainly occurs in old age above 60 years, *Vata prakriti* individuals, as naturally dominance of *Vata dohsa* is more than that of *Kapha* and *Pitta doshas*. When individuals with such risk factors consume *Vata Prakopaka vihar aahar*, rate of degradation outpaces the rate of repair.

(Rate of tissue synthesis < Rate of tissue degradation) (Quantitative changes are seen)

Vataprakopak Hetus

Aharaja (dietary factors) - *Katu* (pungent), *Tikta* (bitter), *Kashaya* (astringent) *Rasatmaka* (taste).

Sheeta (cold), *Ruksha* (dry), *Laghu* (light) *Gunatmaka* (quality).

Pramitashana (minute quantity food consumption)

Vishama-ashana (consumption of food at variable time) etc.

Viharaja (lifestyle factors)- *Vegadharan-udirana* (control/ forceful emaciation of natural urges), *Nisha jagrana* (awakening at night), *Atiucchabhashan* (excessive/loud speaking), *Ativyavaya* (excessive indulgence in sexual activity), *Plavana-Atiadhva-Ativyayama -Ativichhestihai* (excessive swimming, jumping- walking, exercise, hard work) etc.

Manasa (emotional factors)- *Chinta* (excessive worry), *Bhaya* (excessive fear), *Shoka* (grief) etc.

Kalaja (time-oriented factors)- *Greeshma Ritu* (summer season), *Ahoratribhuktaante* (end time of day-night-digestion).

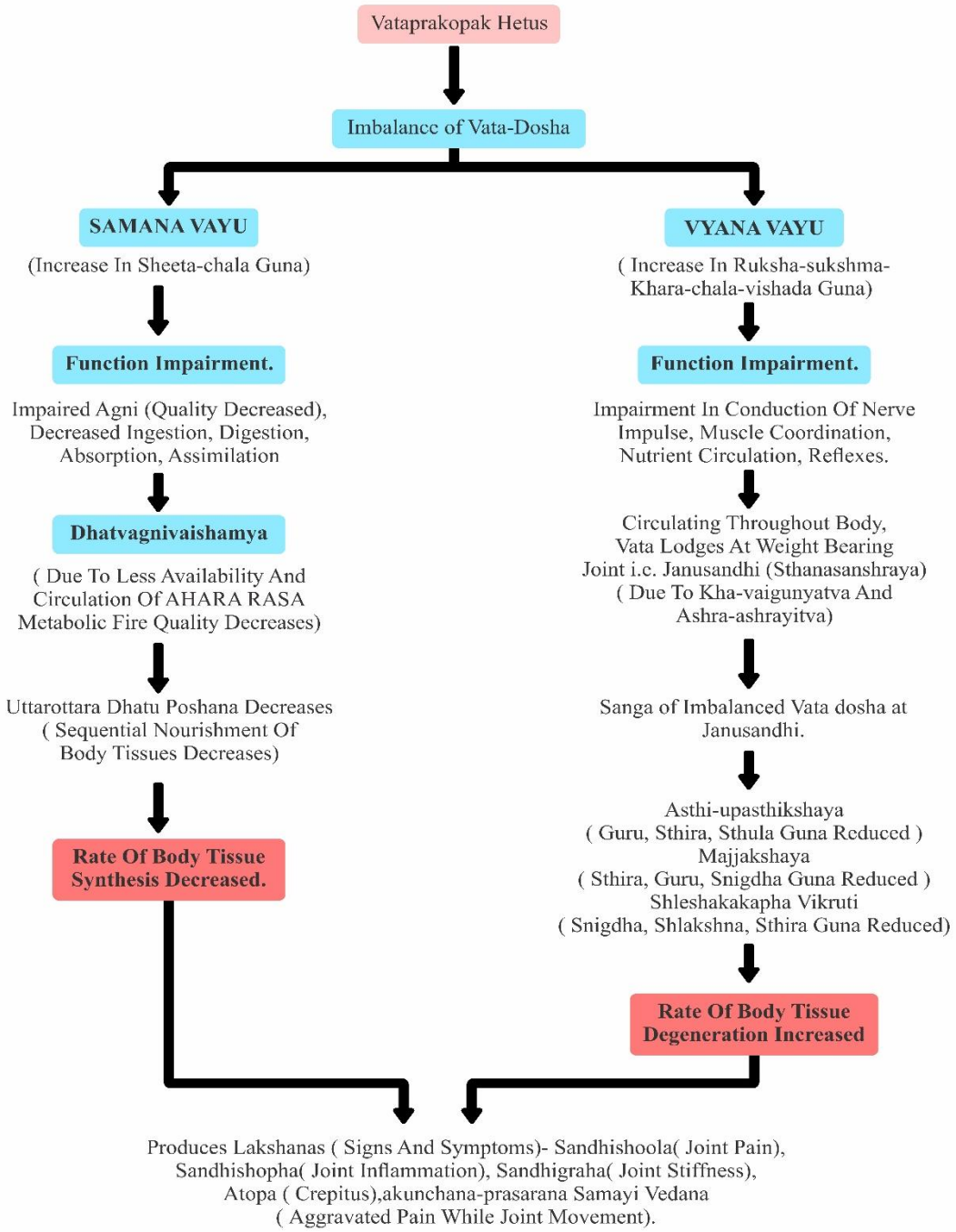

Fig.1 Dhatukshayjanya Samprapti /nirupastambhita Samprapti.

2. *Marga-avrodhjanya Samprapti /Upastambhita Samprapti*.

It mainly occurs in obese person of any age.

Consumption of *Kapha, Pitta prakopak aahar vihar* further initiates and progress the *Samprapti*.

(Rate of weak tissue synthesis=/>rate of strong tissue degradation) (Qualitative and Quantitative changes occur).

Tridoshaprakopaka Hetu

Aharaja (dietary factors) -*Madhura* (sweet), *Katu* (pungent) *Rasatmaka* (taste) food, *Guru* (heavy), *Snigdha* (unctuous), *Sheeta* (cold), *Abhishyandi* (causing secretions), *Picchila* (slimy) *Gunatmaka* (quality) food, *Virrudha ahara sevana* (consumption of incompatible food).

Ati-Adhya-Ajirna-ashana (overeating-eating while indigestion) etc.

Viharaja (lifestyle factors) -*Divaswapna* (sleeping at daytime), *Alpavyayama* (less exercise) etc.

Manasa (emotional factors) -*Krodha* (anger), *Lobha* (greed) etc.

Other factors–*Aharavidhividhana upekshya* (not following eating ethics)

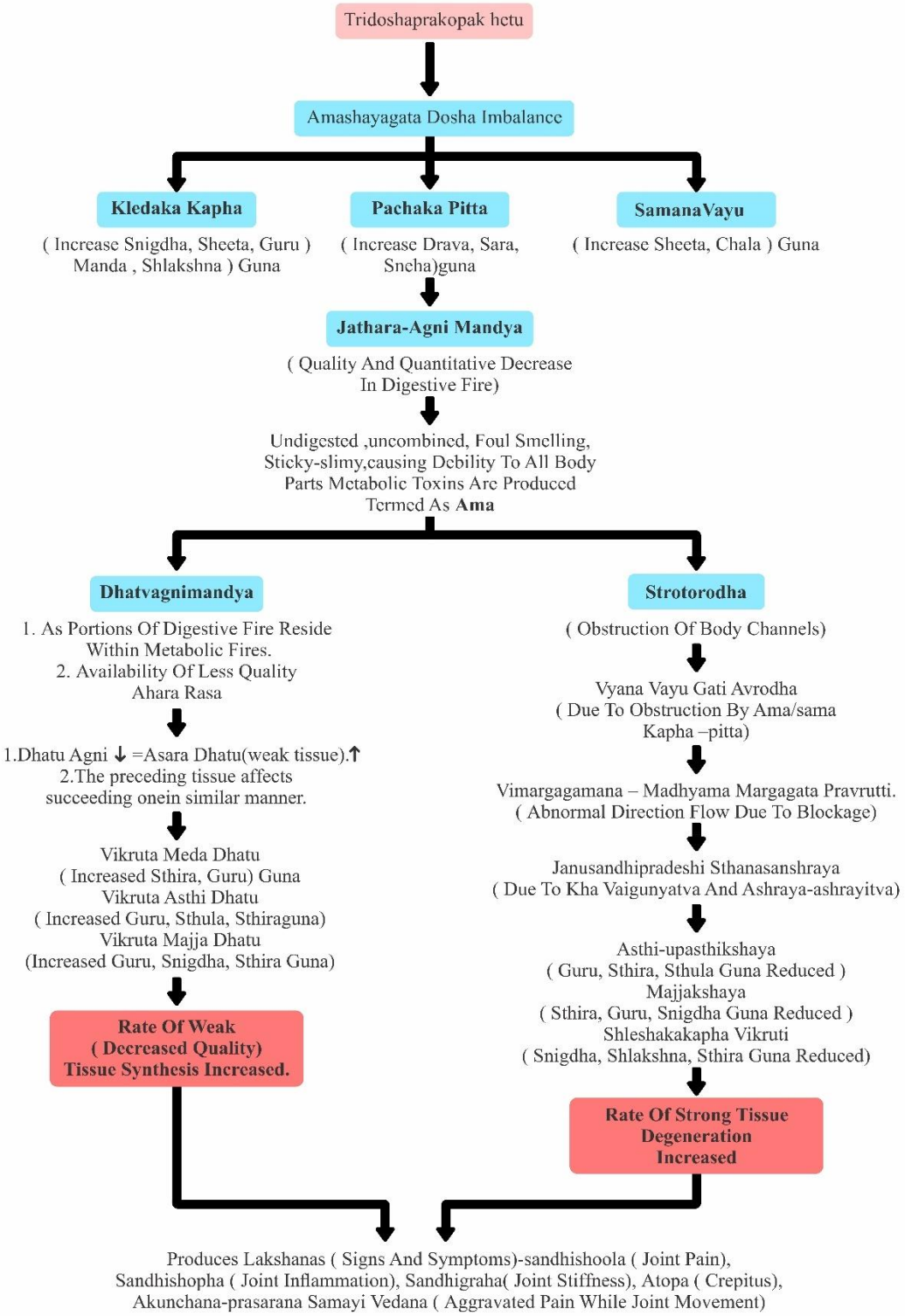

Fig.2 Marga-avrodhjanya Samprapti / Upastambhita Samprapti.

Samprapti Ghataka

Dosha- Vata (Pradhana), kapha
Dushya- Asthi, Majja, Meda
Agni-Jatharagni, Dhatu-agni, Panchamaha Bhutagni – (All Agni Vaishamya/mandya)
Srotas-Asthivaha, Majjavaha
Srotodusti-Sanga, Vimarga gamana
Udbhava sthana-Pakvashaya
Sanchara sthana-Sarva sharira
Adhishthana-Janu sandhi
Vyakti sthana-Sandhi
Roga marga-Madhyama
Rogavastha-Chirkari

Svabhava-Dhatu-kshaya-janya/Marga-avrodhajanya *Sadhya-asadhyatva-Kashtasadhya/yapya*

Table 1: Summary of conceptual relationships [14]

Ayurvedic Concept	Modern Correlation
Asthi kshaya/Vikrut asthi utpatti	Subchondral bone sclerosis, osteophyte formation
Upa-asthi kshaya	Cartilage degeneration (breakdown of type 2 collagen/ proteoglycans)
Majjadhatu kshaya/Vikrut majja utpatti	Bone marrow lesions, cysts formation
Shleshaka kapha vikruti	Reduced synovial fluid volume, impaired joint lubrication and nourishment
Meda dhatu vikruti	Synovitis
Vata Prakopa	Increased joint friction, accelerated tissue wear, Altered biomechanics

Table 2: Contents of Shadanga Guggulu[15][16]

S.No.	Local Name	Latin Name	Family Name	Part Used
1.	*Rasna*	*Pluchea Lanceolata*	Asteraceae	Root
2.	*Devdaru*	*Cedrus Deodaru*	Pinaceae	Bark
3.	*Shunthi*	*Zingiber Officinale*	Zingiberaceae	Root Rhizome
4.	*Eranda*	*Ricinus Communis*	Euphorbiaceae	Root
5.	*Guduchi*	*Tinospora Cordifolia*	Menispermaceae	Root
6.	*Guggulu*	*Commiphora Mukul*	Burseraceae	Gum Resin
7.	*Go ghrita*	Cow ghee	Animal source	Whole

Table 3: Ayurvedic pharmacodynamics and classical indication of herb of *Shadanga Guggulu*[16]

Drugs	*Rasa*	*Guna*	*Virya*	*Vipaka*	*Doshakarma*	Relevant Therapeutic Uses
Rasna	*Tikta*	*Guru*	*Ushna*	*Katu*	*Kaphavatajit*	*Amapachana, Vednahara, Shothahara, Vishaghna, Anuvasanopaga, Vayasthapana, Shleshmasanshamana*
Devdaru	*Tikta, Katu*	*Laghu, Snigdha*	*Ushna*	*Katu*	*Kaphavatajit*	*Shothahara, Vibandhanasha, Amahara, Anuvasanopaga, Katuskandha, Vatasanshamana.*
Shunthi	*Katu*	*Laghu, Snigdha*	*Ushna*	*Madhura*	*Kaphaanilaharam*	*Amapachana, Vednahara, Shothahara, Shulaprashamana, Deepaneya, Vibandhahara*
Eranda	*Madhura, Katu, Kashaya*	*Snigdha, Tikshna, Sukshma, Guru, Sara, Picchila*	*Ushna*	*Madhura*	*Kaphapittajit, Anilanashana*	*Bhedaneeya, Svedopaga, Angamardaprashamana, Adhobhagahara, Vatasanshamana, Vayastapana, Strotovishodhana, Balakaram.*
Guduchi	*Tikta, Kashaya*	*Laghu, Snigdha*	*Ushna*	*Madhura*	*Tridoshaghna*	*Vayasthapana, Balya, Agnideepana, Rasayana.*
Guggulu	*Tikta, Katu, Madhura, Kashaya*	*Laghu, Tikshna, Sukshma, Sara, Snigdha, Picchila*	*Ushna*	*Katu*	*Tridoshahara*	*Vednasthapana, Analadeepana, Sandhana, Rasayana, Balya, Shofahara.*
Ghruta	*Madhura*	*Guru, Snigdha, Sukshma, Sara,*	*Sheeta*	*Madhura*	*Tridoshashamaka*	*Analadeepana, Balya, Bruhana, Rasayana*

		Yogavahi, Sheeta, Mrudu				

Table 4: Contemporary Pharmacological evidences of *Shadanga Guggulu* individual herbs

Drug	Contemporary Pharmacological Evidences
Rasna	Protective against cognitive deficits[17] rejuvenating and anti-inflammatory effect, anti-arthritic effect, immunosuppressive, anti-oxidant activity[18]
Devdaru	Anti-inflammatory, analgesic, anti-oxidant, anti-apoptotic, anxiolytic[19] anti-hyperlipidemic, antiproliferative [20]
Shunthi	Antioxidant by radical scavenging, antiarthritic, anti-inflammatory, analgesic [21] anti-atherosclerotic, digestive stimulant, immunomodulatory, neuroprotective [22]
Eranda	Anti-inflammatory, analgesic, antioxidant, immunomodulatory. [23]
Guduchi	Antioxidant, analgesic, hypolipidemic, anti-osteoporotic, immunomodulatory [24]
Guggulu	Hypolipidemic, anti-inflammatory, analgesic, anti-oxidant[25]
Ghruta	Anticancer activity, nootropic activity. [26][27]

DISCUSSION

Probable mode of action of *Shadanga Guggulu*

Vatasanshamana (pacifying *Vata*), *Agnisamikarana* (quality enhancement of digestive fire), *Balya* (promotion of strength) and *Rasayana* (rejuvenation) play a key role in treatment of *Dhatukshayjanya* (degenerative pathogenesis) *Janusandhigatavata*.

Tridoshshamana (pacifying *Kapha, Pitta, Vata*), *Agnideepana* (stimulation of digestive fire), *Strotorodhashodhana* (removal of blockages within body channels), *Amapachana* (digestion of metabolic toxins), *Prakrut Dhatunirmiti* (increasing quality of tissue) *Balya* (promotion of strength) and *Rasayana* (rejuvenation) play a key role in treatment of *Marga-avrodhajanya* (obstructive pathogenesis) *Janusandhigatavata*.

Shadanga Guggulu is an Ayurvedic formulation of 5 herbs including *Guggulu* that has been prepared in the *Ghrita*. *Ghrita* has *Yogvahi* characteristic meaning it has a unique ability to act as a catalyst or carrier that enhances the therapeutic properties of herbs mixed with it, without losing its own medicinal qualities thereby increasing bioavailability and efficacy of drugs. *Madhura rasa*, *Madhura vipaki*, *Guru-Snigdha-Sukshma-Sara gunatmaka Ghrita* and *Eranda* leads to *Vatasanshamana* thereby decreasing tissue wear n tear, reduced friction and stabilizing altered biomechanics resulting in decrease joint pain and rate of tissue degeneration. *Tikta Rasa*, *Ushna virya*, *Katu vipaka*, *Laghu-Sukshma-Tikshna Gunatmaka Devdaru*, *Rasna*, *Guggulu* leads to *Kaphasanshamana* thereby reducing inflammation and pain, providing nourishment and stability to the joint. *Madhura –Titkta -kashaya rasa*, *Ushna virya*, *Madhur vipaki*, *Laghu-Snigdha gunatmaka Guduchi* is responsible for *Sangrahini karya* hereby reducing the increased *Drava guna* of *Pitta* and stimulating digestive fire leading to *Strotoshodhana* and ultimately performing *Balya* and *Rasayana Karma.*

Constituents of the drugs act at the molecular level, to modulate several inflammatory signaling pathways. Mechanisms involve Cytokine receptor modulation by reducing TNFalpha binding and NF-kB activation leading to decrease proliferation, apoptosis resulting in decrease Synovial inflammation (*Shophahara Karma).*[28] Suppression of IL-1beta signaling pathway by reducing MMP-3, MMP-9 and Nrf2 pathway leads to Chondrocyte prevention by antioxidant activity resulting in avoidance of Cartilage degradation(*Dhatukshaya* prevention). Desensitization of TRPV1-Capsaicin receptor reduces peripheral Pain Signaling (*Vednasthapana Karma*).[29] Mild activation of opioid receptors leads to Central Analgesic modulation which helps in Mood regulation and neuroprotection (*Shulahara*, *Manasa balavardhana Karma*). [30] NF-kB nuclear translocation inhibition reduces inflammatory transcription that is *Amapachana* and *Doshashamana* at cellular level [28] *Shadanga guggulu* exerts its therapeutic actions through a multi-dimensional mechanism involving *Vata-Kapha shamana*, *Ama pachana*, *Agnideepana*, *Strotoshodhan* and *Dhaatu poshana*. These integrated actions justify its classical indication in *Janu Sandhigata Vata* and provide a scientific rationally for its use in the management of Knee osteoarthritis.

CONCLUSION

This study, based on a critical appraisal of classical Ayurvedic literature alongside contemporary biomedical evidence, establishes meaningful and theoretical sound correlations between the Ayurvedic

concept of *Janu sandigatavata* and the pathological changes observed in the knee osteoarthritis. The analysis highlights the pivotal role of *Dosha* imbalance-particularly *Vata* -along with *Ama* formation in initiating and perpetuating degenerative alterations within bone and cartilage tissues. The convergence of Ayurvedic and modern perspective underscores a shared understanding of progressive tissue degeneration while also elucidating distinctive ayurvedic insights into systemic contributors such as *Dosha* dysregulation, joint microenvironment (*Shleshaka kapha*) and metabolic impairment (*Ama*). Contemporary medicine has found a way to minimize the intensity of pain and by adopting knee transplant measures facilitate the quality of life to some extent but these are always associated with adverse effects and are costly. As noted above, ingredients of *Shadanga Guggulu* are primarily supported by current documentation for their anti-arthritic, anti-oxidant, anti-proliferative, anti-atherosclerotic properties and for treating and preventing osteoarthritis. Further research is necessary to prove the safety and effectiveness of these herbal drugs to manage osteoarthritic pain and inflammation.

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***Address for correspondence**
Dr. Nawale Darshana Subhash
PG Scholar,
Department of Kayachikitsa,
Yashwanta Ayurvedic College
PGT and RC, Kodoli, Kolhapur,
Maharashtra.
Email:
nawaledarshana94@gmail.com