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Review Article

Ayurvedic Management of *Sandhivata* (Osteoarthritis): A Comprehensive Review of Pathophysiology, Therapeutic Strategies, and Clinical Evidence

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ABSTRACT

Background: Osteoarthritis (OA) is a leading cause of chronic joint disability worldwide [1, 2]. Its Ayurvedic counterpart, *Sandhivata*, is classified under *Vatavyadhi*, characterized by pain, stiffness, swelling, and crepitus [3–5]. Conventional management—including analgesics, NSAIDs, physiotherapy, and joint replacement—offers symptomatic relief but lacks curative potential and carries adverse effects [1, 2]. Ayurveda, with its emphasis on *Shodhana* (purification), *Shamana* (palliative), and *Rasayana* (rejuvenative) measures, provides a holistic framework for prevention and management. Objective: To synthesize classical Ayurvedic theory and contemporary biomedical evidence for managing *Sandhivata* and correlate Ayurvedic pathophysiology with modern OA mechanisms. Methods: Literature was retrieved from PubMed, Scopus, Google Scholar, DHARA, and AYUSH Research Portal using terms such as “*Sandhivata*,” “Ayurveda AND Osteoarthritis,” “Panchakarma OA,” and “*Boswellia*.” Classical texts (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, and *Bhavaprakasha*) were reviewed [3–6]. Studies were included if they evaluated Ayurvedic interventions in OA (clinical or preclinical). Results: Ayurvedic pathogenesis—vitiated Vata, Dhatu Kshaya of Asthi Dhatu, Shleshaka Kapha depletion, and Ama accumulation—correlates with cartilage loss, synovitis, and oxidative stress in modern OA [1, 2, 3–6]. Panchakarma procedures such as *Abhyanga*, *Swedana*, and *Basti* restore lubrication and mobility [3–6]. Herbs like *Boswellia serrata* [7, 9, 11, 12, 14–16], *Commiphora wightii*, and *Withania somnifera* [11, 14] show anti-inflammatory and chondroprotective effects. Clinical trials report significant improvements in WOMAC and VAS scores [7–13, 15, 16], with good safety profiles. Conclusion: *Sandhivata* management in Ayurveda offers a biologically plausible, multimodal approach targeting the structural, metabolic, and inflammatory dimensions

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of OA. Further standardized, biomarker-based RCTs are essential to validate its clinical utility.

INTRODUCTION

OA affects an estimated 528 million people globally [1], producing pain, deformity, and impaired function. Conventional pharmacological therapy is symptomatic and limited by toxicity [1, 2]. Ayurveda conceptualizes *Sandhivata* as a degenerative *Vata* disorder (*Vatavyadhi*) [3–6]. The term combines *Sandhi* (joint) and *Vata* (the principle governing motion), depicting a degenerative and painful joint condition. The Ayurvedic paradigm attributes pathogenesis to *Vata prakopa* from aging, strain, improper diet, and metabolic waste (*Ama*). Therapeutic objectives extend beyond palliation to restoration of doshic balance, *Agni* correction, tissue nourishment, and rejuvenation [3–6].

2 Pathophysiology: A Correlative Perspective

2.1 Modern Understanding of OA

OA involves cartilage matrix degradation mediated by metalloproteinases (MMP-13, ADAMTS-5), chondrocyte apoptosis, and synovial inflammation with cytokines (IL-1 β , TNF- α , IL-6) [1, 2]. Subchondral bone remodeling, osteophyte formation, oxidative stress, and biomechanical overload perpetuate damage.

2.2 Ayurvedic *Samprapti*

According to *Charaka* and *Sushruta*, *Sandhivata* develops from aggravated *Vata dosha* lodging in *Sandhi srotas* [3, 4]. *Dhatu Kshaya* (tissue depletion) of *Asthi* and *Majja Dhatu* mirrors cartilage and bone loss [3, 5]. *Shleshaka Kapha* corresponds to synovial fluid; its depletion explains joint dryness and crepitus [3, 5]. *Ama*

represents inflammatory metabolites that block microchannels, analogous to synovitis [4, 5].

2.3 Comparative Overview (Table 1)

Modern OA Concept	Ayurvedic Correlate	Commentary
Cartilage degeneration	<i>Dhatu Kshaya (Asthi)</i>	Structural loss parallels tissue depletion
Synovial inflammation (IL-1 β , TNF- α)	<i>Ama + Pitta Sopha</i>	Corresponds to toxic-inflammatory buildup
Lubrication loss	<i>Shleshaka Kapha Kshaya</i>	Reduced cushioning and friction
Mechanical stress	<i>Ati-Vyayama, trauma</i>	Etiological factor for Vata aggravation
Pain and stiffness	<i>Vata Prakopa</i>	Neuromuscular and nociceptive aspects

(Adapted from [1–6]).

3 Ayurvedic Management Principles (*Chikitsa Sutra*)

3.1 Diagnosis (*Nidana – Lakshana*)

Causative factors: aging (*Jara*), excessive exertion (*Ati-vyayama*), cold exposure, fasting, erratic lifestyle, and dry diet (*Ruksha Ahara*) [3–6]. Symptoms: pain (*Sandhishula*), swelling (*Shotha*), stiffness (*Stambha*), crepitus (*Atopa*), and restricted motion [3–6].

3.2 Therapeutic Framework

Ayurvedic therapy follows a hierarchy: *Shodhana* → *Shamana* → *Rasayana*.

A. *Shodhana Chikitsa* (Purificatory Therapies) [3–6]

Snehana (Oleation): *Abhyantara* (ghee intake) & *Bahya* (oil massage – *Abhyanga*, *Janu Basti*) soften Vata-deranged tissues.



Swedana (Fomentation): *Nadi Sweda*, *Patra Pinda Sweda* relieve stiffness and mobilize Ama.

B. Shamana Chikitsa (Palliative Therapies)

Single Herbs (Ekal Dravya):

Basti (Medicated Enema): The principal therapy for Vata disorders; *Matra Basti* and *Tikta-Ksheera Basti* correct systemic Vata imbalance [3–6].

Herb	Latin Name	Reported Activity	Key Reference
<i>Shallaki</i>	<i>Boswellia serrata</i>	5-LOX inhibition, anti-inflammatory	[7, 9, 11, 12, 14–16]
<i>Guggulu</i>	<i>Commiphora wightii</i>	Anti-arthritic, NF-κB modulation	[11, 14]
<i>Ashwagandha</i>	<i>Withania somnifera</i>	Adaptogenic, chondroprotective	[11, 14]
<i>Rasna</i>	<i>Pluchea lanceolata</i>	Analgesic, anti-arthritic	[11]

Classical Formulations: *Yogaraj Guggulu*, *Maharasnadi Kwatha*, *Simhanada Guggulu* show clinical benefit in knee OA [7, 10, 20].

C. Diet and Lifestyle (Ahara–Vihara)

Warm, unctuous, nourishing diet; avoid cold, dry, stale food. Regular daily routine (*Dinacharya*), mild yoga (*Pawanmuktasana*, *Tadasana*), adequate rest, and mental calmness reduce Vata aggravation [3–6].

demonstrated significantly greater pain reduction and function improvement sustained for 12 months [9, 10]. Smaller Indian trials combining *Abhyanga*, *Janu Basti*, and *Basti* also reported marked WOMAC improvement [7, 8, 19, 20].

4.2 Herbal and Polyherbal Formulations

Boswellia serrata extracts consistently reduce pain and improve function vs placebo [11, 12, 15, 16]. *Yogaraj Guggulu* and *Ashwagandha Churna* combinations show significant WOMAC score improvement [20]. Mechanistic studies reveal inhibition of 5-LOX, COX, and NF-κB pathways [14, 18].

4 Clinical and Pre-clinical Evidence

4.1 Panchakarma and Multimodal Therapies

A large RCT (n = 151) comparing multimodal Ayurvedic treatment to guideline-based care

Table 2. Representative Clinical Trials

No.	Study & Year	Design (n)	Intervention	Key Outcome	Ref
1	Kessler et al., 2022	RCT (151)	Multimodal Ayurveda vs conventional	↓Pain ↑Function @12 mo	[9]
2	Majeed et al., 2019	DB-RCT (60)	<i>Boswellia serrata</i> extract	↓VAS pain p<0.01	[11]
3	Mohsenzadeh et al., 2023	DB-RCT (70)	Topical <i>Boswellia</i> oil	↓WOMAC p<0.05	[13]
4	Kimmatkar et al., 2003	DB-RCT (30)	<i>Boswellia</i> extract vs placebo	Significant pain relief	[15]
5	Kachare et al., 2025	Open clinical (50)	<i>Yogaraj Guggulu</i> + <i>Ashwagandha</i>	↓WOMAC & ↑QoL	[20]



5 Mechanistic Insights

- Modern pharmacology supports multiple convergent mechanisms for Ayurvedic agents:
- Anti-inflammatory: 5-LOX and COX inhibition, NF-κB suppression (*Boswellia*, *Guggulu*) [14, 18].
- Antioxidant / Chondroprotective: Withanolides reduce ROS and MMP-13 activity.
- Lubrication & Neuromodulation: *Basti* and *Abhyanga* enhance local microcirculation, reduce nociception.
- Gut–Joint Axis: Ayurvedic diet and herbs may modulate microbiota and systemic inflammation (hypothesis).



Figure 1.

6 DISCUSSION

Ayurveda’s multimodal strategy addresses the mechanical, inflammatory, and psychological dimensions of OA. Clinical trials demonstrate benefit with low toxicity [7–13, 15–20]. However, methodological limitations (small samples, heterogeneity, short follow-up) limit definitive conclusions [17, 21].

Future priorities:

- Standardized herbal extracts and GMP compliance.
- Long-term multicentre RCTs with MRI and biochemical endpoints.
- Integration models combining Ayurveda with physiotherapy and analgesic sparing strategies.
- Health-economic and implementation research for scalability.

7 CONCLUSION

Sandhivata reflects a degenerative joint process analogous to OA. Ayurvedic principles—purification, rejuvenation, and individualized

care—offer a rational, complementary framework. Evidence from modern clinical and mechanistic studies supports its potential as a safe adjunct for symptom control and functional improvement. Further robust trials are warranted to validate and mainstream these interventions.

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