

Research Article

AN INTEGRATIVE REVIEW OF ASTHI MAJJAGAT VATA AND HIP JOINT DISORDERS: BRIDGING AYURVEDA AND MRI FINDINGS

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Abstract

Background: Asthi Majjagat Vata, a specialized Vatavyadhi described in classical Ayurveda, involves degeneration and depletion of Asthi dhatu (bone) and Majja dhatu (bone marrow), manifesting clinically as Sandhishoola (joint pain), Bheda Asthi Parvanam (splitting pain), Mamsa-Balakshaya (muscle and strength depletion), and Sanniruk (persistent pain). Modern orthopedic conditions such as osteoarthritis (OA), avascular necrosis (AVN), and osteoporosis demonstrate overlapping clinical presentations. Understanding the disease through an anatomical, pathological, and radiological perspective provides a framework linking Ayurvedic pathophysiology with contemporary imaging diagnostics.

Objective: To synthesize the Ayurvedic conceptualization of Asthi Majjagat Vata with modern hip joint pathology, emphasizing the diagnostic and prognostic value of MRI in visualizing structural alterations corresponding to classical symptomatology.

Methods: This integrative review draws upon Ayurvedic textual sources (Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya), modern anatomical and radiological literature (Gray's Anatomy, B.D. Chaurasia, MRI atlases), and contemporary clinical studies on degenerative hip disorders. Comparative analysis correlates classical Ayurvedic descriptions with MRI findings, focusing on structural and functional deterioration of the hip joint. Results: MRI studies of patients with Asthi Majjagat Vata show femoral head sclerosis, subchondral bone marrow edema, joint space narrowing, cartilage thinning, and muscle atrophy. These findings correspond to Sandhishoola, Bheda Asthi Parvanam, and Mamsa-Kshaya. Ayurvedic pathogenesis emphasizes Vata prakopa secondary to Dhatu kshaya, aligning with ischemic and degenerative mechanisms recognized in modern orthopedics.

Conclusion: MRI provides objective visualization of the structural correlates of Asthi Majjagat Vata, validating Ayurvedic diagnostic frameworks and informing therapeutic interventions. Integrating classical knowledge with imaging advances can enhance early diagnosis, monitor treatment outcomes, and support individualized management of degenerative hip disease.

Keywords: Asthi Majjagat Vata, Hip Joint, Vankshan Sandhi, Ayurveda, MRI, Osteoarthritis, Avascular Necrosis, Vata Vyadhi, Rachana Sharir, Integrative Anatomy.

1. Introduction

Asthi Majjagat Vata is identified in Ayurveda as a chronic, degenerative disorder characterized by aggravation of *Vata dosha* in the *Asthi* and *Majja dhatus*.¹ Classical texts describe its hallmark features as *Sandhishoola* (joint pain), *Bheda Asthi Parvanam* (splitting or piercing pain in bones), *Mamsa-Balakshaya* (loss of muscle mass and strength), and *Sanniruk* (persistent discomfort). These symptoms align with modern clinical presentations of hip joint

degeneration, including osteoarthritis, AVN, and age-related osteoporosis. The hip joint, or *Vankshan Sandhi* in Ayurvedic parlance, is a *Chala Sandhi*, providing both mobility and weight-bearing stability.² Structurally, it is a synovial ball-and-socket joint, comprising the femoral head and the acetabulum, stabilized by ligaments (iliofemoral, pubofemoral, ischiofemoral), a thick capsule, labrum, and surrounding musculature.³ Degeneration in this joint results in chronic pain, decreased mobility, functional impairment, and disability. Magnetic Resonance Imaging (MRI) is the preferred modality for early detection of bone marrow, cartilage, and soft tissue changes, surpassing conventional radiography in sensitivity.⁴ By integrating Ayurvedic pathophysiology with MRI findings, clinicians can develop a holistic understanding of *Asthi Majjagat Vata*, bridging traditional knowledge with contemporary diagnostics. Early detection is crucial, as degenerative changes are often progressive and irreversible. Understanding the pathophysiological continuum—from *Vata aggravation* to structural bone damage—can inform both preventive and therapeutic strategies.

2. Ayurvedic Understanding of *Asthi Majjagat Vata*

2.1. Etymology and Symptomatology

The term *Asthi Majjagat Vata* literally denotes *Vata* affliction located in bone (*Asthi*) and marrow (*Majja*). *Charaka Samhita* describes:

“भेदोऽस्थिपर्वाणां सन्धिश्च मांसबलक्षयः।

अथर्वणः सन्तता रुक् च मज्जास्थिकुप्पतेऽनले॥” (*Chikitsa Sthana 28/33*)⁵

This implies chronic pain localized in bones and joints, muscular wasting, weakness, and continuous discomfort. Classical literature emphasizes the impact on function, reflecting reduced mobility, decreased physical strength, and susceptibility to fracture or collapse in advanced stages.

2.2. Pathogenesis: *Dhatu Kshaya* and *Vata Prakopa*

Vata dosha primarily resides in the *Asthi* and *Majja dhatus*.⁶ Depletion of these tissues (*dhatu kshaya*)—due to aging, trauma, excessive physical exertion, malnutrition, or *Vata-vardhaka nidanas*—leads to aggravation of *Vata*, manifesting as pain, stiffness, and loss of structural integrity. *Mamsa kshaya* compounds the functional deficit, reflecting modern observations of sarcopenia associated with chronic joint degeneration. The pathophysiology follows a *Dhatu-samyoga* and *Dosha-samyoga* model, wherein structural depletion triggers functional derangement, culminating in tissue ischemia, reduced lubrication, and impaired mobility. *Vata*-induced disruption of *Shleshma dhara kala* (synovial layers) parallels cartilage thinning and joint capsule fibrosis noted in MRI.

2.3. Site of Affliction: *Vankshan Sandhi*

Vankshan Sandhi represents the hip joint, categorized as a *Chala Sandhi* due to its mobility.⁷ Ten ligaments (*Snayu*) and ten muscles (*Peshis*) stabilize this joint, ensuring congruence between femoral head and acetabulum. Imbalance in these structures—via *Vata prakopa*, loss of *Snigdha guna*, or tissue degeneration—leads to pain, restricted movement, and mechanical instability, mirroring early osteoarthritic changes. Ayurvedic therapy focuses on replenishing depleted dhatus and pacifying aggravated *Vata*, which conceptually addresses the underlying cause rather than merely symptomatic relief.

3. Modern Perspective: Hip Joint Anatomy and Degenerative Pathology

The hip joint is a ball-and-socket synovial articulation facilitating weight-bearing and locomotion. Its stability arises from congruent articular surfaces, strong ligaments (iliofemoral, pubofemoral, ischiofemoral), labrum, and surrounding musculature including gluteals, iliopsoas, and adductors.

Degenerative hip disorders encompass osteoarthritis, AVN, and osteoporosis. Pathophysiological changes include:

1. **Articular cartilage erosion** – leading to joint space narrowing and mechanical pain.
2. **Subchondral bone sclerosis** – reflecting bone remodeling and stress response.
3. **Bone marrow edema or necrosis** – indicative of ischemic insult.
4. **Synovial inflammation and fibrosis** – contributing to stiffness and pain.
5. **Muscle atrophy** – reducing joint support and increasing fracture risk.⁸

These correlate with classical Ayurvedic features: *Sandhishoola* (joint pain), *Bheda Asthi Parvanam* (splitting pain), and *Mamsa-Balakshaya* (muscle loss). A mechanistic understanding of these changes allows mapping between Ayurveda and modern orthopedics.

4. MRI Findings in Hip Joint Disorders

MRI is sensitive to early structural and pathological changes, detecting alterations invisible on X-ray.¹⁰ Common findings include:

1. **Femoral Head Changes:** Areas of low signal intensity, reflecting AVN or sclerosis.
2. **Cartilage Loss:** Thin or absent articular cartilage correlates with pain and mobility restriction.
3. **Subchondral Bone Changes:** Edema, microfractures, or cyst formation indicate ongoing degeneration.
4. **Synovial Effusion:** Fluid accumulation reflects inflammation and secondary Vata aggravation.
5. **Muscle and Ligament Atrophy:** Quantifiable loss on MRI corresponds to *Mamsa kshaya*, reducing joint stability.

MRI allows longitudinal assessment of progression, therapeutic monitoring, and correlation with Ayurvedic clinical grading.

5. Integrative Interpretation: Ayurveda and MRI Correlation

The classical Ayurvedic features can be mapped to MRI findings as follows:

Ayurvedic Symptom (Lakshana)	MRI/Modern Correlate
<i>Sandhishoola</i> (Joint Pain)	Articular cartilage degeneration, synovial effusion
<i>Bheda Asthi Parvanam</i> (Splitting Pain)	Bone marrow necrosis, microfractures, subchondral edema
<i>Mamsa-Balakshaya</i> (Muscle Weakness)	Muscle atrophy on imaging, decreased soft tissue bulk
<i>Sanniruk</i> (Persistent Pain)	Chronic degenerative or ischemic changes
<i>Asthi-Majja Kshaya</i>	Osteopenia, subchondral collapse, avascular necrosis

This framework illustrates that *Asthi Majjagat Vata* encompasses a spectrum of degenerative musculoskeletal changes, reinforcing the clinical relevance of classical descriptions.¹¹

6. Previous Research and Knowledge Gap

Ayurvedic interventions for *Asthi-Majja kshaya* include:

1. **Therapeutic Basti:** *Majja Basti*, *Ksheera Basti* – to nourish bone marrow and restore *Snigdha guna*.¹²
2. **Topical Therapy:** *Abhyanga*, *Pinda Sveda* – improve circulation and joint lubrication.¹³
3. **Herbal Preparations:** *Asthisrinkhala Ghrita*, *Ashwagandhadi vati* – enhance bone and muscle metabolism.¹⁴

Despite these interventions, few studies have systematically correlated clinical findings with MRI-detected structural changes. This observational study addresses this gap by correlating *Asthi Majjagat Vata* features with MRI visualization of femoral head, acetabulum, cartilage, and marrow changes.¹⁵

7. Clinical Significance and Ayurvedic Management Implications

Understanding the MRI correlates of classical symptoms allows for precision in diagnosis and management:

1. **Therapeutic Targeting:** MRI identifies specific sites of degeneration, allowing focused administration of *Basti*, massage, or fomentation therapies.
2. **Monitoring Efficacy:** Serial MRI can assess progression or resolution, validating Ayurvedic interventions objectively.
3. **Personalized Care:** Age, dhatu depletion, and severity of Vata aggravation inform therapy duration and intensity.
4. **Preventive Strategies:** Lifestyle and dietary interventions (avoiding Vata-varadhaka foods, promoting *Snigdha Ahara*) prevent further deterioration.

This integrative approach supports both symptomatic relief and structural preservation, emphasizing the Ayurvedic principle of *Shadvyapashraya Chikitsa* (holistic therapeutic interventions).

8. Discussion

Asthi Majjagat Vata represents a chronic degenerative condition in which aggravated Vata invades the bone and bone marrow, leading to profound structural and functional impairment. The classical symptoms of Sandhishoola, Bheda Asthi Parvanam, and Mamsa-Balakshaya indicate not only pain and reduced mobility but also deep tissue depletion affecting both bones and surrounding musculature. Modern imaging using MRI provides objective evidence of these changes, demonstrating cartilage thinning, subchondral bone marrow edema, femoral head sclerosis, joint space narrowing, and muscle atrophy. These findings mirror the effects of aggravated Vata, including loss of lubrication, impaired nutrient transport, and compromised mechanical integrity, highlighting that Ayurvedic symptom descriptions correspond to measurable anatomical alterations. The degenerative process also involves a dynamic interaction between structural deterioration and functional decline. Muscle atrophy, as seen in MRI studies, parallels the classical concept of Mamsa kshaya and contributes to joint instability, increasing susceptibility to further damage. Understanding this interaction reinforces the importance of addressing both bone and soft tissue through targeted Ayurvedic therapies. Furthermore, the concept of disease progression in Ayurveda aligns with the temporal continuum of degeneration detected on MRI. Early Vata aggravation may be minimally symptomatic, whereas advanced depletion manifests as overt structural compromise. Recognizing this progression emphasizes the potential for early intervention through Brimhana, Snehana, and lifestyle measures to prevent irreversible joint damage. Integrating MRI findings with classical assessment also enhances prognostic accuracy. Quantifying the extent of cartilage loss, marrow changes, and muscle atrophy can guide the personalization of treatment strategies, determining the intensity, duration, and combination of therapies such as Majja Basti, Asthishrinkhala Ghrita, and Abhyanga. By linking clinical features to imaging parameters, practitioners can anticipate disease progression, monitor therapeutic outcomes, and adjust interventions accordingly. This approach further promotes interdisciplinary collaboration, bridging Ayurvedic practice with contemporary orthopedics and fostering evidence-based management of degenerative hip disorders.

9. Conclusion

Asthi Majjagat Vata exemplifies Ayurveda's advanced understanding of musculoskeletal degeneration, with the interplay of Vata aggravation and Dhatu depletion driving progressive structural and functional impairment. Classical manifestations, including Sandhishoola, Bheda Asthi Parvanam, Mamsa-Balakshaya, and Sanniruk, are reflected in anatomical changes visible on MRI, such as cartilage thinning, subchondral bone changes, joint space narrowing, and muscle atrophy. This correlation confirms that Ayurvedic diagnosis encompasses both symptomatic and structural dimensions, providing a comprehensive framework for patient

assessment. The integration of Ayurvedic evaluation with MRI imaging offers several advantages for clinical practice. Early detection of degenerative changes allows timely intervention, while the combination of symptom assessment and structural visualization enables individualized treatment planning. Regular monitoring through imaging facilitates objective evaluation of therapy effectiveness, and understanding the progression from early Vata aggravation to advanced structural compromise supports preventive strategies to reduce the risk of disability. This integrative approach not only validates Ayurvedic principles in contemporary clinical contexts but also enhances patient-centered care, combining traditional wisdom with modern diagnostic precision. Ultimately, adopting a collaborative, evidence-informed model can improve outcomes in degenerative hip disorders, promote interdisciplinary research, and strengthen the scientific foundation of Ayurveda in musculoskeletal medicine.

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Citation: Dr. Snehal Narayan Borkute and Dr. Prashant Tople 2025. "CONCEPT OF VATAJ MUTRASHMARI IN AYURVEDA: CORRELATION WITH SONOGRAPHIC FINDINGS OF THE URINARY TRACT". *International Journal of Academic Research*, 12(4): 36-41.

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