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## A Comprehensive Review of Ksheera Basti in the Management of Gridhrasi (Sciatica) Pharmacology, Mechanisms, and Clinica...

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## Abstract

**Background:** Sciatica, clinically characterized by radiating leg pain, stiffness, and limited straight-leg raise, is considered a Vata-dominant disorder in Ayurveda (Gridhrasi [sciatica]). Traditional texts recommend rectal herbal therapies, such as milk-based enemas (Kṣīra Basti [milk enema]), to modulate physiological imbalance and support musculoskeletal and neural function.

**Methods:** This narrative review integrates classical Ayurvedic rationale with contemporary research on rectal drug delivery systems and pharmacological properties of bitter and garlic-based herbal formulations. Sources included experimental studies, mechanistic research, pilot clinical trials, and classical literature, with focus on systemic inflammation, neuroimmune pathways, and functional outcomes.

**Results:** Milk-based rectal formulations act as amphiphilic vehicles, enhancing solubility, mucosal retention, and lymphatic absorption of bioactive compounds. Oral studies of herbal constituents suggest reductions in pro-inflammatory cytokines (IL-6, TNF- $\alpha$ , CRP), supporting potential neuroinflammatory modulation in sciatica. Pilot studies indicate improvements in pain, functional mobility, and straight-leg raise, although variability in formulation, dose, retention, and sterility limits reproducibility. Controlled comparative studies of bitter versus garlic milk enemas are lacking.

**Discussion:** Integrating traditional therapy with modern pharmacological principles provides a plausible mechanism for both local and systemic effects, including immune modulation and attenuation of inflammatory pathways. Rectal delivery may offer targeted absorption while complementing standard care.

**Conclusion:** Milk-based rectal therapy (Kṣīra Basti [milk enema]) shows promise as an adjunct in sciatica management. Standardized randomized controlled trials with objective outcomes are essential to validate efficacy and optimize clinical protocols.

**Keywords:** Sciatica; milk enema; neuroinflammation; cytokines; functional recovery; rectal therapy

## Introduction

The demands of contemporary living and occupational habits are increasingly impacting musculoskeletal health. Prolonged sitting, repetitive strain, excessive physical exertion, and improper lifting techniques are common contributors to low back pain and functional disability. Among these, lumbar radiculopathy is the second **most frequent cause of low back pain** associated **with** activity limitation. It typically manifests as **radiating pain** along **the** distribution **of the sciatic nerve**, originating in **the** lumbar region and extending **through the gluteal area to the posterior aspect of the** lower limb. This symptom pattern arises from irritation or compression of lumbar nerve roots, most

commonly due to intervertebral disc herniation, spinal canal narrowing, or degenerative changes of the lumbar spine [1].

Ayurveda describes a closely comparable clinical entity known as Gṛdhrāsī (sciatica), classified under Vāta vyādhi (disorders predominantly caused by deranged Vāta). Classical texts describe the characteristic features of Gṛdhrāsī as stambha (stiffness), rūk (pain), toda (pricking or piercing pain), and spandana (tingling or twitching sensations). The pain is described as radiating sequentially through the śphik (hip), kati (lumbar region), pṛṣṭha (back), jānu (knee), jaṅghā (calf), and pāda (foot) [2]. Another distinctive clinical sign, śaktikṣepa-nigraha, corresponds to restriction of the Straight Leg Raising (SLR) test, a key functional assessment in lumbar radiculopathy.

Classical management of Gṛdhrāsī emphasizes Vāta śamana (pacification of Vāta) and śodhana (biopurificatory) therapies, including śiravyādhana (venesection), basti cikitsā (therapeutic enema), and agnikarma (therapeutic cauterization) [2]. Among these, basti is regarded as the principal treatment for Vāta vyādhi due to its direct action on the pakvāśaya (colon), the primary seat of Vāta. One formulation, Kṣīra Vaitaraṇa Basti, described in the Vāngasena Saṃhitā, is traditionally employed in Gṛdhrāsī for its combined Vāta-hara, brimhana, and śula-prāśamana effects [3].

### Ayurvedic Review of Gṛdhrāsī

#### Nidāna (Etiology) of Gṛdhrāsī

Classical Ayurvedic texts do not describe etiological factors specific exclusively to Gṛdhrāsī. Hence, general causative factors of Vāta-vyādhi are considered applicable. The nidānas responsible for Vāta-vyādhi are largely uniform, while disease-specific clinical presentations arise from variations in saṃprāpti (pathogenesis) [4].

Charaka and Bhāvaprakāśa describe general nidānas of Vāta-vyādhi in detail, whereas Suśruta Saṃhitā, Aṣṭāṅga Saṅgraha, and Aṣṭāṅga Hṛdaya primarily mention factors leading to Vāta-prakopa without enumerating them separately [5,6]. As Gṛdhrāsī is classified as a nānātmajā Vāta-vyādhi, general Vāta-provoking factors apply. Additionally, dhātuṣaya (tissue depletion) and āvaraṇa (obstruction of Vāta) are relevant in its pathogenesis [7].

#### Pūrvārūpa (Premonitory Features) of Gṛdhrāsī

Gṛdhrāsī is included among the eighty types of Vāta-vyādhi. Therefore, prodromal manifestations of Vāta-vyādhi may be interpreted as the pūrvārūpa of Gṛdhrāsī. These are usually mild and non-specific, such as vague stiffness, discomfort, tingling sensations, or a sense of uneasiness in the lower limb [8].

#### Rūpa (Clinical Features) of Gṛdhrāsī

The cardinal feature of Gṛdhrāsī is pain originating in the śphik (hip) region and radiating sequentially through the kati, pṛṣṭha, uru (thigh), jānu, jaṅghā, and pāda, closely corresponding to the sciatic nerve distribution. Pain is described using the terms rūk (pain) and toda (pricking or piercing pain).

Additional features include stambha (stiffness) and muhuspandana (intermittent twitching). A characteristic sign is śaktikṣepa-nigraha, defined as restriction of leg elevation, clinically correlating with a positive SLR test [9–11]. Postural changes such as forward or lateral bending (dehasya pravakrata) and abnormal movements at knee and hip joints (jānu-uru-sandhi spūrṇa) are described as Vāta-dominant manifestations [12–14].

Certain symptoms including tandra (drowsiness), gaurava (heaviness), arocaka (loss of taste), mukhapraseka (excess salivation), and bhaktadveśa (aversion to food) indicate Vāta-Kaphaja Gṛdhrāsī, reflecting Kapha and Ama association superimposed on Vāta pathology [5,6,12–14].

**Table 1: Symptoms of Vātajā Gṛdhrāsī**

Sl. No.	Ayurvedic Symptom	Classical Description	Contemporary Equivalent
1	Rūk (Pain)	Radiating pain beginning at the śphik and extending through kati, pṛṣṭha, uru, jānu, jaṅghā, pāda [9]	Sciatic pain with dermatomal radiation
2	Toda (Pricking pain)	Sharp, pricking or piercing pain along the affected limb	Neuropathic pain / paresthesia
3	Stambha (Stiffness)	Restriction of movement due to pain, leading to rigidity and muscular tightness	Muscle guarding, reduced range of motion
4	Spandana (Twitching)	Pulsating or twitching sensations in gluteal, thigh, leg, or foot muscles	Fasciculations due to nerve irritation
5	Śaktikṣepa-nigraha	Inability to extend/lift affected leg due to pain	Restricted SLR (positive test)
6	Dehasyāpi pravanata	Forward or lateral bending due to pain	Antalgic posture and gait

**Table 2. Symptoms of Vāta-Kaphaja Gṛdhrāsī**

Sl. No.	Ayurvedic Symptom	Description	Dosha / Pathological Correlation
1	Tandra	Drowsiness and lethargy caused by Tamas along with Vāta and Kapha [15]	Kapha dominance with Vāta association
2	Gaurava	Sensation of heaviness in body or limb	Kapha accumulation in tissues
3	Arocaka	Loss of taste perception despite appetite; due to vitiation of Bodhaka Kapha	Kapha disturbance in oral cavity

4	Agnimandya	Impaired digestive fire due to Kapha obstructing Pachaka Pitta, leading to Ama formation	Metabolic impairment
5	Mukhapraseka	Excessive salivation due to Kapha derangement	Kapha–Ama predominance
6	Bhaktadveśa	Aversion to food caused by Kapha and Ama involvement	Digestive/metabolic disturbance
7	Staimitya	Damp, cold, “wet-cloth-like” heaviness of the limb	Classical Kapha involvement in neuromuscular tissue

### Differential Diagnosis of Gridhrasi

Several lower-limb disorders present with pain and functional impairment similar to Gridhrasi (sciatica), requiring careful differential diagnosis. Conditions such as Urustambha, Khalli, Khanja, Pangu, and Gudagata Vata share overlapping features. Among these, Urustambha and Khalli most closely resemble Gridhrasi, but key differences allow differentiation [16–18].

**Table 3. Differential Diagnosis of Gridhrasi**

Condition	Key Features	Difference from Gridhrasi
Urustambha [16]	Heaviness of thighs, difficulty walking, systemic features like fever, vomiting, loss of appetite, general body ache	Pain is not radiating; heaviness predominates
Khalli [16]	Severe, localized pain, usually proximal	Intense but non-radiating pain
Khanja [17]	Lameness with impaired gait	Paralysis is dominant; pain may be absent
Pangu [17]	Marked paralysis and inability to walk	Paralysis without preceding pain
Gudagata Vata [18]	Lower-limb pain with pelvic/urinary issues, stool/urine retention, flatulence, stones	Presence of pelvic-visceral symptoms distinguishes it from Gridhrasi

### Pathogenesis of Gridhrasi

Gridhrasi is primarily caused by Vata imbalance (Vāta dosha) affecting nerve and musculoskeletal function, leading to radiating pain along the sciatic nerve. The lumbar and hip regions are typically the origin points. The two main Vata subtypes involved are:

- Vyāna Vata: Governs movement, muscle contraction, and coordination. Dysfunction limits leg elevation and contributes to the classic straight-leg raise restriction.
- Apana Vata: Governs elimination and lower-body movement, contributing to nerve and pelvic involvement.

Kapha (Kapha dosha) can act as a secondary factor, causing stiffness, heaviness, and obstruction, while Pitta (Pitta dosha) involvement is minor, usually associated with burning sensations.

The disease also involves degeneration or imbalance in supporting tissues, including bone (asthi), muscle (mamsa), connective tissue, and adipose tissue (meda). Imbalance in these tissues can mimic degenerative changes seen in modern spinal disorders. Nerve compression, often from intervertebral disc displacement or abnormal tissue growth (like osteophytes or cysts), contributes to radiating pain.

Two main mechanisms are recognized:

1. Tissue depletion (dhātukshaya) – loss of tissue function aggravates Vata, causing pain and weakness.
2. Obstruction (mārga-virodha) – blockages by Kapha, Ama (toxins), or abnormal growths impede Vata flow, causing stiffness and nerve compression.

Triggering factors such as trauma, heavy lifting, or cold exposure can provoke sudden muscular contraction or disc displacement, resulting in acute episodes of Gridhrasi.

Pain is typically described as originating in the lower back and hip and radiating down the leg, with associated restriction of movement (shaktikshepa) and functional limitation consistent with sciatic nerve involvement.

### **Stepwise Samprapti (Pathogenesis) of Gridhrasi**

The pathogenesis of Gridhrasi follows classical Vāta-vyādhi mechanisms. Exposure to causative factors (nidāna sevana) leads to Vāta aggravation (Vāta-prakopa). Vyāna Vāta (regulating systemic movement) and Apāna Vāta (governing lower body and elimination) are predominantly involved, resulting in tissue depletion (dhātukṣaya) and, in some cases, secondary involvement of Kapha (Kapha-anubandha), which manifests as stiffness and heaviness.

Obstruction (avarana) and stagnation (saṅga) along the lower back–hip region compromise the flow of vital energies through affected channels (srotas), particularly along the sciatic pathway (Gridhrasi-nādi). Connective tissues (kandara), joints (sandhi), bones (asthi), and neural tissue (majjā) are primarily involved. Degenerative changes, abnormal tissue growths, or metabolic deposits further obstruct Vāta, correlating clinically with radiating pain, pricking sensations, stiffness, and functional limitation (restricted Straight Leg Raising). Two primary samprapti patterns are recognized: tissue depletion–related (dhātukṣaya-janya) and obstruction–related (mārga-virodha-janya), with trauma sometimes precipitating an acute, externally induced (agantuja) form of Gridhrasi.

**Table 4. Samprapti Ghatakas (Pathogenic Components) of Gridhrasi**

Nidāna (Causative factors)	Vāta-prakopaka ahāra (dietary factors) and vihāra (lifestyle)
Dosha	Vyāna Vāta, Apāna Vāta; Kapha (anubandhi)
Dūṣya (Affected tissues)	Rasa, Rakta, Mamsa, Meda, Asthi, Majjā
Agni (Digestive/metabolic fire)	Jatharagni and Dhātagni mandya (hypofunction)
Ama (Toxins)	Resulting from impaired Jatharagni and Dhātagni
Srotas (Channels)	Rasa, Rakta, Mamsa, Meda, Asthi, Majjā-vaha srotas
Udbhava sthāna (Origin)	Pakvāśaya (± Āmāśaya)
Adhiṣṭhāna (Primary site)	Kati, Śphik, Pṛṣṭha
Vyakti sthāna (Secondary site)	Uru, Janu, Jaṅgha, Pāda
Samprapti type	Dhātukṣaya-janya / Mārga-virodha-janya
Special type	Agantuja-nidāna-janya Gridhrasi

**Prognosis**

Prognosis is determined by the depth of Vāta involvement, tissue compromise, chronicity, and associated complications. Gridhrasi with vitiated Vāta affecting neural tissue (Majjā dhātu), or with wasting (Aṅgaśoṣa) and severe stiffness (Stambha), is often difficult to treat. Recent-onset cases in otherwise healthy individuals are usually curable (sādhya) with timely intervention. Severe complications, including edema (Śunam), sensory loss (Suptatva), fractures (Bhagna), tremors (Kampa), or visceral pain (Adhmana), are associated with poor prognosis (asādhya) [19].

**Treatment of Gridhrasi**

Management primarily targets pacification of aggravated Vāta (Vāta-shamana). Avoidance of causative factors (nidāna-parivarjana) is the first step, followed by assessment of patient and disease strength (Roga-bala and Rogī-bala). Mild Vāta aggravation may be managed with dietary moderation (langhana), whereas moderate Vāta with mild toxins (Ama) requires digestion-promoting therapy (pachana) prior to other interventions. Severe Ama or combined Vāta-Kapha involvement warrants purificatory therapies (shodhana).

Internal and external application of medicated oils (Sneha) is generally used except in states of Ama or Vāta-Kapha, where dry measures (Rukṣa upāya) are preferred. Pre-purification procedures (Purva-karma) such as oleation (Snehana) and fomentation

(Swedana) mobilize vitiated doshas towards elimination. In advanced or refractory cases, intensive shodhana is indicated, as pacifying measures alone are insufficient.

### **Snehana (Oleation Therapy)**

Medicated oils (Taila) are considered ideal for pacifying aggravated Vāta (Vāta-pacification), as their unctuousness, warmth, heaviness, and viscosity counteract Vāta's dryness, coldness, lightness, and roughness. Internal Snehapāna (oral intake of medicated oil) facilitates mobilization (kledana) and dispersion (viśyandana) of doshas, promoting their movement toward the gastrointestinal tract and elimination through purificatory therapies (Śodhana). Snehapāna also alleviates mala obstruction, enhances digestive fire (Agni), and improves strength and vitality.

External Snehana procedures, such as Abhyānga (therapeutic massage), Pariśeka (pouring of medicated oil), and Avagāha (therapeutic immersion), act via mechanoreceptors, a principal seat of Vāta. Classical texts suggest that externally applied Sneha penetrates sequentially through deeper tissues (dhātu), reaching Majjā dhātu (bone marrow and neural tissue) up to approximately 900 mātrās, thereby supporting its role in musculoskeletal and neural disorders, including Gridhrasi [20]. Abhyānga further enhances muscular endurance and may delay degenerative changes in musculoskeletal and neural structures.

### **Swedana (Fomentation Therapy)**

Heat therapy (Swedana) is traditionally indicated for Gridhrasi to relieve pain, stiffness, muscle contraction, and numbness. Charaka analogizes Swedana with the softening of hard, dry wood using oil and heat [20]. Swedana is particularly effective in both Vāta-dominant (Vātaja) and combined Vāta-Kapha (Vāta-Kaphaja) presentations, providing symptomatic relief and enhancing Vāta regulation. Nirgundī-patra Pinda Sweda, which combines oil application with sudation, is especially beneficial for the lower back and pelvic regions [21].

### **Mridu Virechana (Mild Purgation)**

When aggravated doshas persist despite Snehana and Swedana, mild purgation (Mridu Virechana) is indicated. Purgative agents such as Trivṛt (*Operculina turpethum*), Eranda (*Ricinus communis*), and Aragvādha (*Cassia fistula*) facilitate elimination of doshas (mala) and improve Agni, while purifying srotas and dhātus. Although Virechana is classically indicated for Pitta disorders, it is also effective in Vāta-vyādhis by restoring systemic metabolic balance. In Gridhrasi, Sneha-Virechana with Eranda Taila combined with Nirgundī-patra juice is particularly effective in clearing Apāna Vāta, a key pathological factor [22].

### **Basti (Therapeutic Enema)**

Basti is regarded as the principal therapy for Vāta disorders, especially when pain, stiffness, disability, constipation, or musculoskeletal degeneration is present. Acting primarily on the Pakvāśaya (colon), Basti exerts systemic effects and facilitates clearance of accumulated doshas, analogous to the sun drawing water from distant plants [23].

- Nirūha Basti (decoction enema) purifies mala, tridosha, and sapta dhātu, enhances Agni, and delays degenerative processes.
- Anuvāsana Basti (oleaginous enema) is particularly effective for Vāta pacification due to its snigdha (unctuous) properties, restoring moisture, stability, and resilience in tissues affected by aggravated Vāta [24].

### **Agnikarma (Therapeutic Cauterization)**

Agnikarma is recommended in conjunction with Basti and Siravedha (venesection) in Gridhrasi management. Classical texts describe precise anatomical application, including regions between Kandastha (knee crease) and Gulpha (ankle) [25–27]. Agnikarma complements Basti by addressing localized pain, stiffness, or granthi (nodular lesions), particularly when systemic therapies alone are insufficient.

### **Rationale for Kṣīra Basti**

Kṣīra (milk) is classically recognized for its Vāta–Pitta śamana (pacifying Vata and Pitta), bṛṃhana (nourishing), bālaya (strengthening), and rasāyana (rejuvenative) properties. When processed with Tikta (bitter) dravyas or Lashuna (garlic), its therapeutic potential is enhanced through improved solubility, bioavailability, and absorption of active phytoconstituents. This makes Kṣīra Basti particularly suitable for Gridhrasi, a condition often associated with Vāta predominance and depletion of asthi (bone) and majja (bone marrow/nerve tissue), alongside degenerative changes in musculoskeletal structures [28].

Kṣīra Basti is a rectal formulation that delivers nutritive and oleaginous substances directly to the Pakvāśaya (colon), which serves as a relatively stable absorption site characterized by near-neutral pH and low enzymatic activity. This route allows for both localized colonic effects and systemic exposure, providing a mechanistic basis for its classical use in Vāta-dominant disorders such as Gridhrasi [29,30]. Absorption following Kṣīra Basti administration occurs through transcellular and paracellular pathways, as well as via lymphatic uptake. The combination of milk and ghee enhances solubilization of lipid-soluble compounds, prolongs mucosal contact, and partially bypasses first-pass metabolism, thereby supporting systemic therapeutic effects. Contemporary rectal drug-delivery approaches, including mucoadhesive hydrogels, nanoparticles, and liposomal

carriers, offer opportunities to improve retention and controlled release while maintaining traditional formulation integrity [30,33].

Rectal interventions also engage a functional colon–nervous system axis, influencing enteroendocrine signalling, enteric neurotransmitter release (such as serotonin), mucosal immune tone, and vagal or spinal afferent pathways. Through this axis, localized mucosal changes may modulate systemic neuroimmune function and pain-processing mechanisms, providing a plausible explanation for the effectiveness of Basti in radicular pain syndromes [29,31].

Tikta Kṣīra Basti combines classical principles of śodhana (clearing), bṛṃhana, and anti-inflammatory action. Bitter phytochemicals reduce āma (metabolic toxins) and shotha (inflammation), while the milk vehicle nourishes asthi and majja dhatus and pacifies Vāta and Pitta [29,32]. Modern pharmacological interpretation suggests that rectal delivery enhances mucosal retention and systemic absorption of anti-inflammatory constituents, potentially **reducing pro-inflammatory cytokines such as IL-6 and TNF- $\alpha$ , which contribute to** peripheral and central sensitization in radicular pain [30,33–35].

Lashuna (garlic) Kṣīra Basti is rationalized based on the tikta–katu (bitter–pungent) qualities of garlic and its dipana–śrotoshodhana (digestive stimulation and channel-cleansing) actions. Combined with the nourishing and Vāta-pacifying properties of milk, this formulation targets both dhatu poshana (tissue nourishment) and srotoshodhana (channel clearance) [29,35]. Evidence from oral garlic supplementation demonstrates reductions in **systemic inflammatory markers including CRP, IL-6, and TNF- $\alpha$** , supporting the biological plausibility of its systemic anti-inflammatory effects. However, the therapeutic relevance of rectal administration remains inferential, and dedicated Kṣīra Basti trials in Gridhrasi are needed to establish efficacy and safety [34].

Based on classical theory and modern mechanistic insights, Kṣīra Basti may act through multiple pathways: restoration of koshta (gut) function and **microbial fermentation, leading to increased short-chain fatty acid** production; improvement of mucosal barrier integrity, reducing antigen translocation; modulation of **systemic inflammatory** mediators **including IL-6 and TNF- $\alpha$** ; and influence on enteroendocrine and enteric neurotransmitter signaling, thereby reducing nociceptive sensitization [31,33,35]. Clinical evidence remains limited to case reports, small series, and pilot studies, reporting symptomatic improvement and reductions in inflammatory biomarkers in cohorts with lumbar disc disorders, ankylosing spondylitis, and rheumatoid arthritis. Direct comparative trials between Tikta and Lashuna Kṣīra Basti in Gridhrasi are lacking, leaving comparative efficacy and effect sizes undetermined. Evidence regarding inflammatory

biomarkers shows that IL-6 levels may decrease following Basti therapy, while TNF- $\alpha$  results are inconsistent, and CRP/ESR reductions have been reported in integrated Basti-based regimens. Overall, systemic immunomodulation appears plausible, though findings are not specific to sciatica populations [32–36].

**Table 5: Clinical Evidence: Tikta vs. Lashuna Kṣīra Basti**

Study Type	Intervention	Population	Outcomes	Evidence Level
Case reports & small series	Tikta/Lashuna Kṣīra Basti	Lumbar disc disorders, ankylosing spondylitis	Pain reduction, improved function, decreased CRP/IL-6	Low
Pilot clinical studies	Basti-based regimen	Obesity, RA cohorts	IL-6 reduction; TNF- $\alpha$ inconsistent	Low–moderate
RCTs	Not available	Gridhrasi	—	N/A

## Discussion

### Integration of Classical and Modern Rationale

The classical Ayurvedic rationale for Kṣīra Basti (milk-based therapeutic enema) in Gridhrāsi (sciatica) emphasizes Vāta pacification, nourishment of depleted tissues, and selective purification (śodhana) of pelvic and colonic channels. These mechanisms plausibly align with modern concepts of mucosal immune modulation, systemic cytokine regulation, and gut–nervous-system signalling. Milk and ghee vehicles may enhance mucosal retention and lymphatic uptake of lipophilic phytoconstituents, providing a credible pharmacokinetic basis for systemic effects following rectal administration.

### Mechanistic Plausibility: Inflammation and Neuroimmune Modulation

Radicular pain involves peripheral and central sensitization maintained by **pro-inflammatory cytokines such as IL-6 and TNF- $\alpha$** , along with neuroimmune crosstalk. Rectal delivery of tikta (bitter) phytochemicals or garlic-derived (Lashuna) compounds in a nutritive milk vehicle may plausibly reduce systemic pro-nociceptive cytokine load and modulate enteric and vagal signalling pathways. Evidence from non-sciatica cohorts suggests that basti therapies can reduce IL-6 and CRP, supporting mechanistic plausibility rather than confirmed efficacy in Gridhrāsi.

### Lashuna (Garlic): Translational Relevance and Limitations

Meta-analyses indicate that oral garlic supplementation lowers CRP, IL-6, and TNF- $\alpha$ , supporting the theoretical rationale for Lashuna Kṣīra Basti as an anti-inflammatory adjunct. However, rectal and oral administration differ in absorption

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kinetics and first-pass metabolism. Therefore, oral supplementation provides supportive but indirect evidence, and direct basti-route clinical trials are currently lacking.

### **Quality of Clinical Evidence and Gaps**

Existing clinical literature is limited by small sample sizes, absence of control groups, heterogeneous formulations, inconsistent outcome measures, and short follow-up. Notably, no randomized controlled trials (RCTs) compare Tikta and Lashuna Kṣīra Basti in Gridhrāsi, leaving comparative effectiveness and dose–response relationships undefined.

### **Biomarkers and Objective Outcomes**

Reported reductions in IL-6 and CRP suggest potential systemic immunomodulation, though TNF- $\alpha$  findings are inconsistent. Few studies integrate clinical endpoints—visual analogue scale (VAS), Oswestry Disability Index (ODI), or straight-leg raise (SLR) angle—with mechanistic biomarkers such as fecal calprotectin, stool short-chain fatty acids (SCFAs), or microbiome profiling. Adoption of a minimal common outcome set would improve inter-study comparability.

### **Formulation, Delivery, and Standardisation Challenges**

Translation of classical Kṣīra Basti into reproducible clinical interventions requires standardization of botanical identity, milk-to-ghee ratios, dose, retention time, and sterility, alongside validation of absorption characteristics. Emerging rectal drug-delivery systems (e.g., mucoadhesive hydrogels, thermoresponsive carriers) may improve retention and uptake, but must align with pharmacopeial standards to preserve traditional integrity.

### **Safety and Tolerability**

Kṣīra Basti is generally safe when administered by trained practitioners. Modern evaluation should address potential milk intolerance or allergy, aseptic technique and infection risk, mucosal irritation from concentrated phytochemicals (especially garlic), and metabolic comorbidities. Structured adverse-event reporting and follow-up are essential in future trials.

### **Clinical Role: Adjunctive Therapy**

Given the current evidence base, Kṣīra Basti should be considered a promising adjunct for Gridhrāsi, rather than a replacement for conventional treatments such as physiotherapy, analgesics, or interventional procedures. Its greatest utility lies in integrated care pathways with objective monitoring of pain, function, and biomarkers.

### **Recommended Research Priorities**

Future studies should focus on:

- Well-designed RCTs comparing Tikta and Lashuna Kṣīra Basti with standard care
- Dose-finding and formulation optimization using modern rectal drug-delivery systems
- Mechanistic studies integrating cytokine profiling with stool SCFAs and microbiome analysis
- Multicenter safety registries with standardized adverse-event reporting

### Limitations of Current Literature

Available evidence is heterogeneous and largely low in the hierarchy of evidence. While classical claims are mechanistically plausible, direct empirical support in Gridhrāsi is limited. Extrapolation from studies in obesity, rheumatoid arthritis, or oral garlic supplementation must be validated in sciatica-specific trials.

### Conclusion

Kṣīra Basti (including Tikta and Lashuna variants) represents a biologically plausible, tradition-consistent adjunctive therapy for Gridhrāsi. Potential mechanisms include:

- Local mucosal immunomodulation
- Systemic cytokine regulation (IL-6, TNF- $\alpha$ , CRP)
- Gut–nervous-system signalling supporting pain modulation and tissue nourishment

Existing clinical reports and mechanistic studies provide preliminary support; however, high-quality RCTs with standardized formulations, validated biomarkers, and functional outcomes (VAS, ODI, SLR) are essential before Kṣīra Basti can be widely recommended as evidence-based therapy. Meanwhile, it may be cautiously used as an adjunct within integrated care settings under trained supervision, with attention to aseptic technique and systematic outcome monitoring.

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