

## SCIATICA: ETIOPATHOGENESIS, CLINICAL FEATURES, DIAGNOSIS, AND INTEGRATIVE MANAGEMENT — A COMPREHENSIVE REVIEW

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### ABSTRACT

Sciatica is a common neuropathic pain syndrome characterized by pain radiating along the course of the sciatic nerve, typically affecting the lower back, buttock, posterior thigh, and leg. It is commonly caused by lumbar disc herniation, spinal stenosis, degenerative disc disease, or nerve root compression. Sciatica significantly impacts quality of life and functional capacity worldwide. The prevalence ranges between 10–40% in adults, especially among middle-aged individuals. This review article discusses the anatomy, etiopathogenesis, clinical manifestations, diagnostic modalities, and current management approaches of sciatica from both modern medicine and Ayurvedic perspectives. Contemporary therapeutic modalities include pharmacotherapy, physiotherapy, epidural steroid injections, and surgical interventions, while Ayurveda

correlates sciatica with *Gridhrasi*, a *Vatavyadhi* described in classical texts. Ayurvedic management involving *Panchakarma*, *Basti* therapy, *Agnikarma*, herbal formulations, yoga, and lifestyle modification demonstrates promising outcomes. An integrative approach may provide safer and long-term relief in chronic cases. This review aims to provide comprehensive knowledge regarding sciatica and highlight evidence-based integrative therapeutic strategies.

**KEYWORDS:** Sciatica, Gridhrasi, Sciatic nerve, Lumbar disc prolapse, Ayurveda, Vatavyadhi, Low back pain, Panchakarma.

## INTRODUCTION

Sciatica refers to pain originating from irritation or compression of the sciatic nerve or lumbosacral nerve roots. The condition stands as one of the most common causes of radiating lower limb pain and physical disability. The sciatic nerve, formed from nerve roots L4–S3, is the largest nerve in the human body and supplies the posterior aspect of the lower limb. The condition commonly occurs due to lumbar intervertebral disc prolapse, spinal stenosis, degenerative spine disease, trauma, piriformis syndrome, or various inflammatory conditions. Patients typically present with unilateral radiating pain associated with numbness, a tingling sensation, and localized muscle weakness.

In Ayurveda, sciatica is closely correlated with *Gridhrasi*, which is classified as one among the 80 *Nanatmaja Vata* disorders described in classical Ayurvedic texts. The disease is characteristically defined by a sharp, radiating pain that begins from the *Sphik* (hip) region and sequentially extends to the *Kati* (waist), *Uru* (thigh), *Janu* (knee), *Jangha* (calf), and *Pada* (foot).

### Anatomy of the Sciatic Nerve

The sciatic nerve originates directly from the lumbosacral plexus, specifically incorporating the L4 to S3 nerve roots. It exits the pelvis through the greater sciatic foramen immediately below the piriformis muscle and descends through the posterior aspect of the thigh. Before reaching the knee, it divides into its two main branches: the tibial nerve and the common peroneal nerve. Structurally, the nerve supplies the posterior thigh muscles as well as the essential muscles of the leg and foot, while also providing critical sensory innervation to the skin of the lower limb.

### Epidemiology

The lifetime incidence of sciatica ranges approximately between 13% and 40%, showing its highest prevalence in individuals aged 30 to 50 years. Epidemiological data indicates that the condition is more prevalent among sedentary workers who undergo prolonged sitting and heavy laborers subjected to strenuous physical stress. The primary risk factors associated with its development include obesity, smoking, chronic spinal degeneration, diabetes, and persistent poor posture.

## Etiopathogenesis

### Ayurvedic Classical Inception (Sushruta Samhita)

To understand the baseline etiology in Ayurveda, Acharya Sushruta highlights the structural involvement of the lower limb tendons:

पाष्ण्यभितातात् कण्डरा याऽनिलार्ता। सक्थ्नः क्षेपं निगृह्णीयाद् गृध्रसीति हि सा स्मृता ॥

(*Sushruta Samhita, Nidana Sthana, 1/74*)

- **Meaning:** When the Vata Dosha gets aggravated and vitiates the major *Kandara* (tendon) that extends down to the *Parshni* (heel), it severely restricts the extension, lifting, and free movement of the *Sakthi* (lower limb). This agonizing clinical condition is explicitly designated as *Gridhrasi*.

### 1. Modern Perspective

- **Lumbar Disc Herniation:** The mechanical compression or chemical irritation of lumbosacral nerve roots due to the protrusion or extrusion of intervertebral discs stands as the most common primary cause.
- **Spinal Stenosis:** A progressive narrowing of the central spinal canal or lateral recesses causes direct physical pressure on the traversing nerve roots.
- **Degenerative Disc Disease:** Age-related wear and tear of the spinal discs leads to structural narrowing, localized inflammation, and subsequent nerve compression.
- **Piriformis Syndrome:** The neuromuscular irritation or compression of the sciatic nerve occurs specifically as it passes beneath or through an inflamed, spasmed piriformis muscle.
- **Trauma and Tumors:** High-impact pelvic or spinal injuries, as well as space-occupying lesions like spinal tumors, can directly compress the nerve pathway.

### 2. Ayurvedic Perspective

In the Ayurvedic paradigm, *Gridhrasi* is caused predominantly by an aggravated *Vata Dosha*, though it is sometimes associated with *Kapha Dosha* as an enveloping factor (*Avarana*).

- **Nidana (Etiological Factors):** The primary causes include lifestyle habits such as excessive walking, heavy weight lifting, physical trauma, and the habitual suppression of natural urges (*Vega-dharana*). It is further exacerbated by systemic factors like an irregular diet, excessive fasting, and prolonged exposure to cold environments.
- **Samprapti (Pathogenesis):** Due to these etiological factors, the vitiated *Vata* localizes specifically in the *Kati-Pradesha* (lumbar region). From there, it infiltrates and affects the

local *Kandara* (tendons) and *Snayu*(ligaments) of the lower extremity, ultimately causing severe radiating pain, stiffness, and structural dysfunction.

### Pathogenesis according to Ashtanga Hridaya

Acharya Vagbhata explicitly characterizes the mechanical and pathological progression of *Gridhrasi* as follows:

पार्श्वि प्रत्यङ्गुलीनां या कण्डरा मारुतार्दिता। सक्थ्युत्क्षेपं निगृह्णाति गृध्रसीं तां प्रचक्षते ॥

(*Ashtanga Hridaya, Nidana Sthana, 25/54*)

- **Clinical Meaning:** When the *Maruta* (aggravated Vata Dosha) afflicts and damages the prominent *Kandara* (tendon/nerve bundle) that travels down toward the *Parshni* (heel) and extends to the *Anguli* (toes), it restricts or completely impairs the *Sakthyutkshepam* (the ability to lift or extend the lower limb). This distinctive pathological state is designated as *Gridhrasi*.

### Clinical Features

#### Ayurvedic Classical Manifestation (Charaka Samhita)

Acharya Charaka outlines the exact anatomical progression of the symptoms:

स्फिक्पूर्वा कटिपृष्ठोरुजानुजङ्घापदं क्रमात् । गृध्रसी स्तम्भरुक्तोदैर्गृह्णाति स्पन्दते मुहुः ॥

(*Charaka Samhita, Chikitsa Sthana, 28/56*)

- **Meaning:** The vitiated *Vata* or *Maruta* grips the lower body parts in a highly systemic sequence, beginning from the *Sphik* (buttock/hip) and moving through the *Kati* (waist), *Prishta* (back), *Uru* (thigh), *Janu* (knee), *Jangha* (calf), and finally reaching the *Pada* (foot), producing intense stiffness (*Stambha*), continuous pain (*Ruk*), and a distinct pricking sensation (*Toda*).

### 1. Symptoms

Patients typically present with severe radiating lower back pain that travels deeply into the buttock pain and extends continuously down to the posterior thigh and leg. This is frequently accompanied by a distressing tingling sensation, localized numbness along the respective dermatome, noticeable muscle weakness, and progressive difficulty in walking.

## 2. Signs

Clinical evaluation typically reveals a positive Straight Leg Raising (SLR) Test, a reduced or absent ankle reflex, and observable sensory deficits along the affected nerve path. In chronic or severe cases, marked muscle wasting may be observed in the affected lower extremity.

### Classification of Gridhrasi (Types)

#### Clinical Variations according to Bhavaprakasha

Acharya Bhavamishra provides clear, distinct diagnostic features for both variants to aid in clinical differentiation:

वातजायाम् भवेत्तोदो देहस्यापि वक्रता, जानु कट्यूरु संधीनाम् स्फुरनम् भृशम्।  
वात श्लेष्मोद्भवायाम् तु निमित्तं वह्निमार्दवं, तन्द्रा मुखप्रसेकाश्च भक्तद्वेषस्तदैवच ॥

(*Bhavaprakasha, Vata Vyadhi Chikitsa, 533*)

#### • Clinical Meaning and Explanation

- **In Vataja Gridhrasi:** The clinical presentation is dominated by acute, sharp pricking pain (*Toda*), visible scoliosis or structural distortion of the body/spine (*Dehasyapi Vakrata*), and intense, frequent twitching or throbbing (*Sphuranam Bhrisham*) across the joints of the knee (*Janu*), waist (*Kati*), and thigh (*Uru*).
- **In Vatakaphaja (Vata-Shleshma) Gridhrasi:** The condition is accompanied by a marked reduction in digestive fire (*Vahnimardavam* / low metabolic rate), persistent drowsiness or lethargy (*Tandra*), excessive salivation (*Mukhapraseka*), and a profound aversion to food or anorexia (*Bhaktadvasha*).

## Diagnosis

### 1. Clinical Examination

A comprehensive bedside assessment requires a detailed neurological examination alongside the Straight Leg Raising Test to confirm nerve root tension. This must be supported by a precise motor and sensory assessment to map out the exact level of lumbosacral disc involvement.

### 2. Imaging Modalities

- **Magnetic Resonance Imaging (MRI):** This remains the gold standard investigation for evaluating lumbar disc pathology, nerve root impingement, and soft tissue changes.
- **Computed Tomography (CT) Scan:** This is highly useful for defining bony abnormalities, lateral recess stenosis, and osteophyte formations.

- **Plain X-ray:** This baseline test effectively detects structural degenerative changes, disc space narrowing, and spondylolisthesis.

### 3. Electrodiagnostic Studies

Electromyography (EMG) and Nerve Conduction Studies (NCS) are highly recommended to objectively analyse nerve conduction velocities and differentiate active radiculopathy from peripheral nerve entrapments.

### 4. Differential Diagnosis

To ensure accurate diagnostic precision, clinician must rule out lumbar spondylosis, sacroiliitis, peripheral neuropathy, cauda equina syndrome, intrinsic hip joint pathologies, and vascular claudication.

## Management

### 1. Modern Management

- **Conservative Treatment:** Initial therapy relies heavily on pharmacological agents including NSAIDs for inflammation, muscle relaxants for localized guarding, neuropathic pain agents for radicular distress, and short-term oral corticosteroids. This is paired with structured physiotherapy targeting stretching exercises, core strengthening, and mechanical posture correction.
- **Lifestyle Modification:** Long-term stabilization requires focused weight reduction, ergonomic spinal adjustments during daily activities, and specific activity modification to avoid lumbar strain.
- **Interventional Procedures:** In cases resistant to oral medications, localized interventions such as epidural steroid injections or targeted nerve root blocks are utilized to reduce nerve root swelling.
- **Surgical Management:** Surgical decompression is strictly indicated in patients presenting with progressive neurological deficits, cauda equina syndrome, or persistent, debilitating pain that fails conservative care. The most common surgical procedures performed are microdiscectomy and laminectomy.

### 2. Ayurvedic Management

#### Foundational Principle of Treatment (Chikitsa Sutra)

Acharya Charaka outlines the systematic, gold-standard clinical line of management for *Gridhrasi* in the following cardinal principle:

## अन्तराकण्डरागुल्फं सिरा बस्त्यग्निकर्म च । गृध्रसीषु प्रयुञ्जीत खल्ल्यां तूष्णोपनाहनम् ॥

(*Charaka Samhita, Chikitsa Sthana, 28/101*)

### • Clinical Meaning and Explanation

- **Antara-kandara-gulpha Sira (Venesection):** In patients suffering from *Gridhrasi*, the foremost intervention should be *Siravyadha* (venesection/bloodletting) performed specifically at the *Antara-kandara-gulpha* region (the anatomical space between the ankle joint and the Achilles tendon). This procedure effectively decompresses localized blood stagnation and provides rapid relief from acute radicular pain.
- **Basti Karma (Medicated Enema):** Since *Gridhrasi* is fundamentally a severe *Vatavyadhi*, *Basti* therapy is advocated as the premier internal therapeutic modality to eradicate the root cause by systemically pacifying the aggravated *Vata Dosha*.
- **Agnikarma (Therapeutic Cautery):** For chronic, deep-seated pain and severe stiffness that resist conventional therapies, *Agnikarma* (thermal micro-cautery) is indicated to alleviate localized neural irritation.

Because *Gridhrasi* is correlated with a severe *Vatavyadhi*, the foundational approach is built around systemic and localized *Vatahara* (Vata-pacifying) therapies.

- **Shodhana Therapy (Bio-purification):** The core clinical cleansing involves *Basti Karma* (medicated enemas) as the ultimate line of treatment for Vata, supported by deep *Snehana* (oleation) and *Swedana* (sudation). In refractory cases, specialized paracurgical modalities such as *Agnikarma* (thermal micro-cautery) and *Raktamokshana* (bloodletting) are deployed.
- **Shamana Therapy (Palliative Care):** Systemic internal healing is achieved through the administration of classical Ayurvedic medicines. This includes potent anti-inflammatory Guggulu formulations like *Yogaraja Guggulu* and *Trayodashanga Guggulu*, alongside deep tissue-reparative decoctions such as *Maharasnadi Kwatha* and *Dashamoola Kwatha*, amplified by the vata-purgative action of *Eranda Taila*.
- **Yoga and Rehabilitation:** Physical rehabilitation focuses on regular, careful practice of specific spinal extension asanas such as *Bhujangasana* (Cobra pose), *Makarasana* (Crocodile pose), *Shalabhasana* (Locust pose), and *Pavanamuktasana* (Wind-relieving pose) to decompress the lumbar roots.

### Comprehensive Line of Treatment (Ayurvedic Clinical Protocol)

Since *Gridhrasi* is categorized fundamentally as one among the classical *Vata* disorders, all therapeutic measures must prioritize the pacification of *Vata Dosha*.

- 1. Snehana (Oleation):** This protocol involves the systematic external application, localized sprinkling, or therapeutic pouring of warm, medicated taila over the affected lumbar and lower limb regions to counteract dryness and rigidity.
- 2. Swedana (Sudation):** Thermal therapies such as tub baths, *Pizhichil* (rich oil pouring), *Patrapinda Sweda* (sudation using heated bags filled with medicated herbal leaves and pastes), and *Upanaha Sweda* (application of warm medicinal poultices) are highly beneficial in relieving localized spasm and stiffness.
- 3. Mridu Samshodhana (Mild Purification):** To clear the channels and reverse the downward movement of vitiated humors, a mild purgation (*Mridu Virechana*) is clinically preferred using castor oil or specialized formulations.
- 4. Basti (Medicated Enema):** Administered as the premier internal therapeutic modality, *Basti* works directly at the primary site of *Vata* to achieve deep systemic pacification and tissue nourishment.
- 5. Shiravyadha / Raktamokshana (Venesection):** For rapid pain relief, direct venesection is explicitly advised to be performed at a distance of four *Angulas* (approximately 3 inches) either above or below the knee joint on the affected leg.
- 6. Agnikarma (Therapeutic Cautery):** Thermal micro-cautery is precisely executed using a metallic rod (*Shalaka*) directly over the areas of maximum pain intensity or near the root of the little toe of the affected leg to alleviate deep-seated nerve irritation.

### Herbs Useful in Sciatica

The clinical management of *Gridhrasi* benefits significantly from specific single herbs noted for their analgesic, anti-inflammatory, and nervine-tonic properties:

- *Nirgundi* (*Vitex negundo*)
- *Bala* (*Sida cordifolia*)
- *Punarnava* (*Boerhavia diffusa*)
- *Eranda* (*Ricinus communis*)
- *Shigru* (*Moringa oleifera*)
- *Rasna* (*Pluchea lanceolata*)
- *Jambira* (*Citrus limon*)
- *Masha* (*Vigna mungo*)

### Essential Ayurvedic Medicine Formulations

A comprehensive prescription matrix may integrate the following classical formulations depending on the patient's specific bio-characteristics:

- **Guggulu Preparations:** *Yogaraja Guggulu, Gokshuradi Guggulu, and Kaishora Guggulu.*
- **Herbal Decoctive Kashayas:** *Prasarinyadi Kashaya, Sahacharadi Kashaya, Rasnaerandadi Kashaya, Punarnavashtaka Kashaya, Rasnasaptaka Kashaya, and Kokilakshadi Kashaya.*
- **Specialty Herbo-Mineral Tablets & Kashayams:** *Khanjanikari Rasa, Vishamusti Vati, and Mushtadi Marma Kashayam.*
- **Medicated Oils (Internal & External Use):** *Gandha Tailam, Eranda Taila, and Ksheerabala Tailam.*

### Prevention

Long-term preventive strategies are critical to avoid recurrence and include maintaining correct ergonomics and spinal posture during daily activities. Incorporating regular physical exercise, strictly avoiding prolonged sitting, maintaining active weight management, utilizing proper body mechanics and lifting techniques, and practicing stress management are foundational to preserving lumbosacral health.

### Complications

Neglected or untreated sciatica can lead to the development of chronic pain syndrome, progressive muscle weakness, structural foot drop, long-term physical disability, and profound psychological distress stemming from chronic unmanaged pain.

### Recent Advances

Recent clinical studies highlight the evolving role of regenerative therapies, including Platelet-Rich Plasma (PRP) injections and targeted stem cell therapy, for intervertebral disc repair. Concurrently, modern clinical frameworks are recognizing integrative rehabilitation programs. Emerging global evidence strongly supports the structured implementation of Yoga and classical Ayurveda as highly effective, evidence-based adjunctive therapies for the management of chronic low back pain and radicular sciatica.

## DISCUSSION

Sciatica remains a significant global health problem due to its high prevalence, recurrent nature, and substantial socioeconomic burden. Although conservative modern management is highly effective for acute stabilization in most patients, chronic or refractory cases often require multifaceted, multimodal treatment approaches.

Ayurveda provides comprehensive, holistic management by directly addressing the root cause of the condition through the correction of *Dosha* imbalances and the long-term improvement of musculoskeletal integrity. *Panchakarma* therapies, when combined with customized yoga protocols and targeted herbal medicines, can significantly reduce pain, decompress nerve roots, and elevate the overall quality of life. An integrative medical paradigm that combines advanced modern diagnostics with traditional therapies offers superior, sustainable, and long-term therapeutic outcomes.

### Ayurvedic Classical Description & Review

#### 1. Charaka Samhita Reference

##### Classical Pathological Exposition and Commentary

Acharya Charaka outlines the symptomatic manifestation, which is further elucidated by the commentator Chakrapanidatta to differentiate the two clinical presentations:

स्फिक्पूर्वा कटिपृष्ठोरुजानुजङ्घापदं क्रमात्। गृध्रसी स्तम्भरुक्तोदैर्गृह्णाति स्पन्दते मुहुः॥

वाताद्वातकफातन्द्रागौरवारोचकान्विता॥

(*Charaka Samhita, Chikitsa Sthana, 28/56-57*)

#### As explained by Chakrapanidatta

- **Vataja Gridhrasi Lakshana:** *Prathamam Sphicham Stambharuktodairgrihnati, Pashchatu (Kramat) Katiprishtorujanu-janghapadam Grihnati Sa Gridhrasi Vatat* — The disease initiated by pure Vata first grips the *Sphik* (buttock region) with intense stiffness (*Stambha*), pain (*Ruk*), and pricking sensations (*Toda*), and subsequently moves in a strict sequential order down through the waist, back, thigh, knee, calf, and foot. Frequent, localized twitching (*Spandate Muhuh*) is highly characteristic of this pure Vata state.
- **Vatakaphaja Gridhrasi Lakshana:** *Vatakaphatu Sa Purvoktalakshanasati Tandradayanvita Bhavati* — When caused by both Vata and Kapha, the condition presents with all the aforementioned sequential radiating pain symptoms, but is

fundamentally accompanied by *Tandra* (lethargy/drowsiness), *Gaurava* (profound heaviness of the limb), and *Arotochaka* (loss of taste/anorexia).

## 2. Sushruta Samhita Reference

पाष्प्यभितातात् कण्डरा याऽनिलार्ता। सक्थः क्षेपं निगृह्णीयाद् गृध्रसीति हि सा स्मृता ॥

(*Sushruta Samhita, Nidana Sthana, 1/74*)

- **Clinical Meaning:** The Vata Dosha localizes in the deep tendons of the heel and sole, severely impairing the extension and lifting capacity of the leg.

## 3. Ashtanga Hridaya Reference

Acharya Vagbhata provides a highly concise structural definition of the disease:

गृध्रसी नाम वातव्याधिः सक्थः कण्डरामाश्रिता ।

(*Ashtanga Hridaya, Nidana Sthana, 15/53*)

- **Meaning:** The disease known as *Gridhrasi* is a distinctive *Vatavyadhi* that occurs specifically when the vitiated *Vata Dosha* takes shelter (*Ashrita*) in the *Kandara* (tendons and nerve pathways) of the *Sakthi* (lower extremity).

## CONCLUSION

Sciatica is a disabling neuropathic condition affecting millions of individuals worldwide. Early clinical diagnosis and timely multi-specialty intervention are essential to prevent permanent neurological complications. While modern medicine provides highly effective symptomatic relief and rapid acute stabilization, Ayurveda offers comprehensive, deep-seated management targeting the underlying pathology without systemic adverse effects. Integrative clinical approaches involving structural lifestyle modifications, professional physiotherapy, classical *Panchakarma*, and therapeutic yoga provide a highly sustainable, safe, and holistic recovery path. Further large-scale clinical trials and rigorous evidence-based studies are strongly recommended to further validate the global efficacy of Ayurvedic interventions in sciatica management.

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