

## **Overview of Causes, Risk Factors, and Management of Sciatica: A Review**

### **Abstract:**

Root pain in the sciatic nerve distribution area caused by one or more herniated lumbar discs is a common and often debilitating event. The lifetime incidence of this condition is estimated to be between 13% and 40%. Fortunately, most cases can heal on their own with simple pain relief and physical therapy. However, this situation can become chronic and stubborn, and have a major impact on the social economy. This review looks at the epidemiology, causes, risk factors, and management of sciatica. Factors that influence the incidence of sciatica include height, age, genetic predisposition, walking, jogging (if there is a history of sciatica), and specific physical occupations, including driving. The influence of the protruding nucleus pulposus and the possible inflammatory response mediated by cytokines in the lumbar and sacral nerve roots are discussed. Abnormal immune responses and possible mechanical factors are also considered factors that can mediate pain. The current topic of different treatment modalities is also discussed.

**Keywords:** Sciatic nerve, Overview, Causes, Risk Factors, Management, Sciatica, Review

## Introduction

The sciatic nerve is the longest and thickest (nearly finger-width) nerve within side the frame. It is truly made from 5 nerve roots: from the decrease again area referred to as the lumbar backbone and 3 from the very last phase of the backbone referred to as the sacrum. The 5 nerve roots come collectively to shape the proper and left sciatic nerve. On every aspect of the frame, one sciatic nerve runs via the hips, buttocks, and down the leg, finishing on the top perspective of the popliteal fossa. The sciatic nerve then branches into different nerves, which preserve down the leg and into the foot and toes. Sciatica refers to infection of the sciatic nerve that reasons ache that radiates alongside the course of the sciatic nerve, which branches from the decrease again via the hips and buttocks and down every leg. Typically, sciatica impacts most effective one aspect of the frame; however, it's viable for sciatica to arise on each sides. It's virtually a be counted of in which the nerve is being pinched alongside the spinal column. [1]

Sciatica is a totally not unusual place complaint. About 40% of humans within side the U.S. enjoy sciatica in some unspecified time in the future of their lives. Back ache is the 0.33 maximum not unusual place cause humans go to their healthcare provider. Sciatica is maximum normally because of an damage or infection to the sciatic nerve, which originates within side the buttock/gluteal place and takes place while a herniated disk, bone spur at the backbone, or narrowing of the backbone (spinal stenosis) compresses a part of the nerve. ([2] This reasons inflammation, ache, and regularly a few numbness within side the affected leg. Although the ache related to sciatica may be excessive, maximum instances remedy with non-operative remedies in some weeks. People who've excessive sciatica, that is related to widespread leg weak point or

bowel or bladder changes, is probably applicants for surgery. Sciatica may be triggered because of a real damage to the sciatic nerve, that is truly rare, however the term "sciatica" is normally used to explain any ache that originates withinside the decrease again and radiates down the leg. [1]

If the affected person has "sciatica," he studies moderate to excessive ache everywhere alongside the course of the sciatic nerve, that is, everywhere from the decrease again, via the hips, buttocks, and/or down the legs. It also can motive muscle weak point withinside the affected leg and foot, numbness, and an unsightly tingling pins-and-needles sensation withinside the leg, foot, and toes. People generally describe sciatica ache in specific ways, relying on its motive. ([3] Some humans describe the ache as sharp, shooting, or jolting. Others describe this ache as "burning," "electric" or "stabbing." The ache can be steady or come and go. Also, the ache is generally greater excessive withinside the leg as compared to the decrease again. The ache might also additionally experience worse in case you take a seat down or stand for lengthy intervals of time, while you rise up and while you twist your top frame. A compelled and unexpected frame movement, like a cough or sneeze, also can make the ache worse. For a few humans, the ache from sciatica may be excessive and disabling. For others, the sciatica ache is probably rare and irritating, however it has the capability to get worse. [3]

Sciatica can seem unexpectedly or gradually. It relies upon at the motive. A disc herniation can motive unexpected ache. Arthritis withinside the backbone develops slowly over time.

## **Objectives:**

The study aims to summarize the updated evidence regarding the epidemiology, risk factors, etiology, pathophysiology, clinical manifestation, diagnosis, and management of sciatica.

## **Sciatica Prevalence:**

On the incidence and prevalence of sciatica, there is a dearth of accurate data. Sciatica affects between 5% and 10% of patients with low back pain, with a lifetime frequency of 49 %- 70%. [2] It is estimated that 2.2 percent of the general population suffers from intervertebral disc-related sciatica each year. Age, height, mental stress, smoking, and vehicle vibrations are some of the personal and professional risk factors for sciatica that have been reported. The evidence linking sciatica to sex or physical health is mixed. [3]

## **Sciatica: causes and risk factors**

Gender, body habit, parity, age, genetic variables, occupation, and environmental factors are among the environmental and inherent elements known to influence the development of sciatica. Understanding the causes of sciatica will help you focus your treatment on the problem's fundamental cause rather than just covering the symptoms. Direct nerve compression, inflammation, an aberrant reaction of the body's immune

system, or a combination of these factors are the causes of sciatic nerve injury. [4, 5]

### **Common causes of sciatica:**

Herniation of the lumbar disc. According to studies, lumbar disc herniation is responsible for up to 90% of sciatica. [5]: One or more spinal nerve roots (L4S3) that constitute the sciatic nerve are frequently compressed by a herniated disc. Sciatica can be caused by lumbar disc herniation in two ways:

1. Compression that is applied directly Compression can occur directly on the sciatic nerve when a lumbar disc herniates (including sex disc disease) or when the soft interior material of the intervertebral disc leaks or bulges through the extrafibrous nucleus (non-closed disc disease) and compresses the nerve.
2. Inflammation caused by chemicals Intervertebral disc material (hyaluronic acid) can leak acidic chemical irritants, producing inflammation and irritation surrounding the sciatic nerve. [5,7]

A herniated intervertebral disc can put pressure on the spinal cord.

### **Less common causes of sciatica:**

Rarely, sciatica can be caused by tumors, infections, scar tissue formation, fluid accumulation, Pott's disease (tuberculosis of the spine), or lumbar fractures. Although rare, sciatica can also be a complication of improper gluteal injection or hip replacement surgery. [13]

Approximately 1% of pregnant women may develop sciatica at some point during pregnancy. [14]

### **Risk factors for sciatica:**

Regarding the risk factors for sciatica, there are some common risk factors that can cause irritation and inflammation of the sciatic nerve. Understanding risk factors can help prevent problems. [12] The most common risk factors are:

**Aging:** As the patient gets older, his body loses flexibility, and it takes longer to heal after the injury. A common form of pain associated with ageing is back pain, which is closely related to sciatica. Fortunately, chiropractic is a good way to overcome back pain in its entirety.

**Smoking:** Smoking is not only harmful to the lungs, it also increases the risk of back pain and sciatica. Smoking increases inflammation, reduces blood circulation and weakens the immune system. Also, it will make it harder for the body to function and heal from injuries.

**History of low back pain:** Studies have shown that patients with low back pain are more likely to suffer from sciatica. If left untreated, low back pain can cause inflammation of the lower back and spine, and if it can spread to the sciatic nerve,

Poor general health: Healthy eating and regular exercise are not just for feeling and/or looking good; they can also reduce the likelihood of sciatica and help reduce inflammation.

Happiness can improve activity capacity. If our overall health is not good, it will be difficult to stay active and healthy. By staying active, you can reduce the chance of back pain.

### 5) Obesity

It is beautiful, but it is also important to be healthy. Being overweight is one of the strongest predictors of back pain and other musculoskeletal problems, including sciatica. Studies have shown that adipose tissue can produce an inflammatory market that affects the entire body. This is important because sciatica is caused by inflammation of the sciatic nerve. Therefore, if your body is inflamed, you are more likely to experience pain problems.

Work-related injuries: Work-related injuries caused by sedentary or repetitive exercise can increase the risk of sciatica. In particular, the following working conditions are related to sciatica in the medical literature: Standing or walking for a long time, driving for a long time, whole body vibration, pulling or kneeling for more than 15 minutes at a time.

To avoid work-related injuries, it is important to take breaks, rest, and stretch muscles frequently.

Sleep problems: Have you ever had sleep problems? If so, the risk of back pain and sciatica will increase. Insufficient sleep is associated with a variety of diseases, including general poor health, obesity, and chronic pain. Adequate sleep can reduce inflammation, which is why it is critical for sciatica.

Psychological distress: low back pain and sciatica are related to being overwhelmed or under pressure. Monotonous work and general stress can exacerbate musculoskeletal diseases, including nerve pain.

Direct injury: Occasionally, sciatica can be caused by an injury to the hip or buttocks. For example, sitting on a big wallet will directly put pressure on the nerves.

### **Sciatica Diagnosis:**

Sciatica is diagnosed mainly through medical history and physical examination. By definition, patients report radioactive leg pain. They may be asked to report the distribution of pain and whether it radiates below the knee, and they can use drawings to assess the distribution. Sciatica is characterised by radiating pain that follows a skin disease pattern. Patients may also report sensory symptoms.

**Physical examination** is highly dependent on neurological examination. The straight leg elevation test, also known as the

Lasègue sign, is the most commonly used research. People with sciatica can also have low back pain, but it is usually not as severe as leg pain. The diagnostic value of the history and physical examination has not been well studied. [15] There is no item in the history or physical examination with high sensitivity and high specificity. The overall sensitivity of the straight leg lift test is estimated to be 91%, and the corresponding overall specificity is 26%. [16] The only test with high specificity is the straight-leg lift test. Its overall specificity is 88%, but its sensitivity is only 29%. In general, if a patient reports typical radiating leg pain and shows a positive result on one or more neurologic tests, indicating nerve root tension or neurologic deficits, the diagnosis of sciatica appears reasonable. [16]

### **Sciatica Diagnosis: Role of Imaging**

Diagnostic imaging is only useful if the results have an impact on subsequent treatment. The diagnosis of acute sciatica is made based on the patient's medical history and physical examination, and therapy is conservative (non-surgical). Only if there are indicators or "red flags" indicating the sciatica is caused by an underlying condition (infections, malignancies) rather than a disc herniation may imaging be recommended at this time.

Patients with severe symptoms who have not responded to conventional treatment for 6–8 weeks may benefit from diagnostic imaging. In certain circumstances, surgery and imaging may be utilized to determine whether

a herniated disc with nerve root compression is present, as well as its location and extent. As part of the choice to operate, it's critical that the clinical findings and symptoms match up nicely. [22]

### **Treatment of sciatica:**

- **Conservative treatment**

The main goals of conservative sciatica treatment are to alleviate pain with analgesics and to relieve pressure on the nerve root. In most patients, conservative treatment does not appreciably alter the natural course of sciatica or reduce symptoms, according to a new comprehensive analysis. [25] Patients should be properly informed about the etiology and expected prognosis as part of the management approach. Patients' education regarding sciatica, on the other hand, has not been particularly addressed in randomized controlled studies.

- The majority of the therapies offered lack strong evidence of efficacy. The consequences of pain and functional status are similar when bed rest and remaining active are recommended. [26] Because of this revelation, long-term bed rest, which was once the cornerstone of sciatica treatment, is no longer necessary.
- Most of the to be had interventions lack robust proof of efficacy. The pointers of mattress relaxation and staying energetic have little distinction withinside the results of ache and useful status. [26] Due to this discovery, long-time period mattress relaxation, the spine of sciatica treatment, is not extensively recommended. Analgesics,

non-steroidal anti inflammatory drugs, and muscle relaxants do now no longer appear to be extra powerful than placebos in decreasing symptoms. There is a loss of proof for opioids and numerous combos of drugs. A systematic evaluate suggested that there may be no proof that traction, non-steroidal anti inflammatory drugs, intramuscular steroids, or tizanidine are advanced to placebo. [24] This evaluate shows that epidural steroids can be powerful in sufferers with acute sciatica. [24] However, a current systematic evaluate of a massive quantity of randomised trials suggested that there may be no proof for the short-time period high quality results of corticosteroid injections, and the long-time period results are unknown. [25] The identical systematic evaluate suggested that energetic bodily remedy (exercise) does now no longer appear like higher than inactivity (mattress relaxation) remedy and different conservative remedies which include traction, massage, heat, or corsets). [25]

- As regards the level of evidence for conservative treatment of sciatica, Stay active, unlike bed rest (may be beneficial) while on pain relievers or non-steroidal anti-inflammatory drugs, acupuncture, epidural steroid injection, spinal manipulation, traction therapy, physical therapy, behavioural therapy, or multidisciplinary therapy (effect unknown).

- **Surgical treatment:**

Sciatica can be treated surgically with the excision of a herniated disc or the removal of a decisive part of the disc or foraminal stenosis. The goal is to find out what's causing the patient's sciatica. The goal of treatment is to alleviate leg pain and its symptoms, not to alleviate back pain. The general view is that cauda equina syndrome requires prompt surgery. Unilateral sciatica can be treated with elective surgery. Only one rather old randomised trial comparing surgical surgery with conservative care in people with sciatica was available until recently. [27] After one year, surgical intervention was determined to be better, but no significant changes were detected after four and 10 years of follow-up. [27]

### **Prognosis of sciatica**

The available randomized clinical trials evaluating disc surgery and chemical nucleolysis are summarized in the Cochrane Review. [28] Papaya chymotrypsin is injected into the disc to shrink the nucleus pulposus in nuclear chemical disintegration. The results of intervertebral disc surgery are better than chemolysis for persons with severe sciatica that lasts more than 4 weeks to more than 4 months, according to the review. Nuclear chemical dissolution outperforms the placebo effect. As a result, this study suggests that disc surgery is more effective than a placebo. The authors concluded that there is substantial evidence that surgical discectomy can give effective clinical relief for carefully chosen sciatica patients who cannot be treated conservatively due to lumbar disc prolapse based on data from all three trials. [23, 24]

## Conclusion

Sciatica is a common disease, the main cause of absenteeism and the main economic burden of industrial and health services. Although the intervertebral disc is closely related to the pathophysiology of the disease, the exact nature of its relationship to the intervertebral disc, nerves, and pain is uncertain. Current evidence suggests that the nucleus pulposus can cause a strong inflammatory response at the root of the sciatic nerve, which may be the source of pain. There is also evidence that inflammation, abnormal immune factors, and mechanical deformation of nerves are necessary to produce pain, which appears to be a possible combination. However, the bulge of the nucleus pulposus is not the only cause of sciatica, and other causes cannot be ignored. Fortunately, most cases of sciatica are self-limiting, and the pain tends to subside within a few months. However, some cases will progress to chronicity. Unfortunately, these may be difficult to treat.

## References:

1. Risk factors for low back pain and sciatica: an umbrella review, Patricia Parreira, Chris G. Maher, Daniel Steffens, Mark J. Hancock, Manuela L. Ferreira, *The Spine Journal*, Volume 18, Issue 9, 2018, Pages 1715-1721,
2. Weinstein JN, Lurie JD, Olson PR, Bronner KK, Fisher ES. Trends and regional variations in lumbar spine surgery in the United States, 1992–2003. *Spine* 2006; 31: 2707-14. [Free article from PMC][[PubMed](#)] [[Google Scholar](#)]

3. Younes M, Bejia I, Aguir Z, Letaief M, Hassen-Zroer S, Touzi M, et al. Prevalence and risk factors of disc-related sciatica in an urban population in Tunisia. *Joint Bone Spine* 2006;73(5):538-42. [[PubMed](#)] [[Google Scholar](#)]
4. Stafford MA, Peng P, Hill DA. Sciatica: a review of history, epidemiology, pathogenesis, and the role of epidural steroid injection in management. *British Journal of Anaesthesia*, vol. 99, no. 4, pp. 461-473, 2007. doi: 10.1093/bja/aem238.
5. nt. *J. Pharm. Bio. Arch.* 2011, 2. Kumar, M. Epidemiology, pathophysiology, and symptomatic treatment of sciatica: A review.
6. Molinos M, Almeida CR, Caldeira J, Cunha C, Gonçalves RM, Barbosa MA. Inflammation in the degeneration and regeneration of intervertebral discs [published correction appears in *J R Soc Interface.* 2015 Jul 6; 12(108): 20150429]. doi:10.1098/rsif.2014.1191. 2015;12(104):20141191.
7. Donnally III, CJ, Varacallo M, Lumbar Degenerative Disk Disease. [Updated on October 27, 2018][Internet] StatPearls. Treasure Island (FL): StatPearls Publishing, 2019.01. Accessible at: <https://www.ncbi.nlm.nih.gov/books/NBK448134/>.
8. Valat J-P, Genevay S, Marty M, Rozenberg S, Koes B, Sciatica. *Best Practice & Research in Clinical Rheumatology.* 2010;24(2):241-252. doi: 10.1016/j.berh.2009.11.005.

10. Melancia JL, Francisco AF, Antunes JL. Spinal stenosis. Elsevier, 2014, pp. 541–549 in Handbook of Clinical Neurology. doi:10.1016/b978-0-7020-4086-3.00035-7.

11. Ombregt L. The dural concept. In: Elsevier's A System of Orthopaedic Medicine, 447–472.e4. doi:10.1016/b978-0-7020-3145-8.00033-8.

12. Eastlack J, Tenorio L, Wadhwa V, Scott K, Starr A, Chhabra A. Sciatic neuromuscular variants on MR neurography: frequency study and interobserver performance. doi:10.1259/bjr.20170116. Br J Radiol. 2017;90(1079):20170116.

13. Gujrathi R, Gupta K, Ravi C, Pai B, Sciatica: An Extremely Rare Complication of the Perianal Abscess. 2016;81:370–373. Pol J Radiol. doi: 10.12659/PJR.897269. Published on August 6, 2016.

14. Katonis P, Kampouroglou A, Aggelopoulos A, et al. Pregnancy-related low back pain. Hippokratia. 2011;15(3):205–210.

15. Vroomen PCAJ, Krom MCTFM de, Knottnerus JA. Diagnostic value of history and physical examination in patients suspected of sciatica due to disc herniation: a systematic review. J Neurol 246: 899-906, 1999. [[PubMed](#)] [[Google Scholar](#)]

16. Deville WLJM, Windt DAWM, van der Dzaferagic A, Bezemer PD, Bouter LM. The test of Lasegue: a systematic review of the accuracy in diagnosing herniated discs Spine 2000; 25:1140-7. [[PubMed](#)] [[Google Scholar](#)]

17. Jensen MC, Brant-Zawadzki MN, Obuchowski N, Modic MT, Malkasian D, Ross JS. People without back pain often have

- magnetic resonance imaging of the lumbar spine. N. The English Journal of Medicine 331: 69-73, 1994. [[PubMed](#)] [[Google Scholar](#)]
18. Modic MT, Ross JS, Obuchowski NA, Browning KH, Cianflocco AJ, Mazanec DJ. A Natural History Pilot Study of Contrast-enhanced MR Imaging in Acute Lumbar Radiculopathy: A Natural History Pilot Study. *Radiology* 1995; 195: 429–35. [[PubMed](#)] [[Google Scholar](#)]
19. Modic MT, Obuchowski NA, Ross J, Brant-Zawadzki MN, Grooff PN, Mazanec DJ, et al. Acute low back pain and radiculopathy: MR imaging findings and their prognostic role and effect on outcome. *Radiology* 2005; 237:597–604. [[PubMed](#)] [[Google Scholar](#)]
20. Lumbar radicular pain, Govind J. *Aust Fam Phys*, 34:409-12, 2004. [[PubMed](#)] [[Google Scholar](#)]
21. Awad JN, Moskovich R. Lumbar disc herniations: surgical versus nonsurgical treatment. 2006;443:183-97. [[PubMed](#)] [[Google Scholar](#)]
22. Diagnostic evaluation of low back pain with emphasis on imaging. Jarvik JG, Deyo RA. 586–97; 137:586–97. [[PubMed](#)]
23. Weber H, Holme I, Amlie E. The natural course of acute sciatica with nerve root symptoms in a double-blind placebo-controlled trial evaluating the effect of piroxicam (NSAID). *Spine* (1993); 18:1433-8. [[PubMed](#)] [[Google Scholar](#)]

24. Vroomen PCAJ, Krom MCTFM, Slofstra PD, Knottnerus JA. A systematic review of conservative treatments for sciatica *J Spinal Dis*;13:463-9, 2000. [[PubMed](#)] [[Google Scholar](#)]
25. Luijsterburg PAJ, Verhagen AP, Ostelo RWJG, Os TAG van, Peul WC, Koes BW. Effectiveness of conservative treatments for the lumbosacral radicular syndrome: a systematic review *Eur Spine J*, 6 April 2007 (Epub ahead of print). [Free article from PMC] [[PubMed](#)]
26. Hagen KB, Jamtvedt G, Hilde G, Winnem MF. The updated Cochrane review of bedrest for low back pain and sciatica *Spine* 2005; 30:542-6. [[PubMed](#)] [[Google Scholar](#)]
27. Weber H. Lumbar disc herniation. A controlled prospective study with ten years of observation. *Spine* 1983;8:131-40. [[PubMed](#)] [[Google Scholar](#)]
28. Gibson JN, Waddell G. Surgical interventions for lumbar disc prolapse. [[PubMed](#)] *Cochrane Database Syst Rev* 2007, Jan 24; 1: CD001350.
29. Van Tulder MW, Koes B, Seitsalo S, Malmivaara A. An evidence-based review of the outcomes of invasive treatment modalities for back pain and sciatica S82-92 in *European Spine Journal*, 2006. [Free article from PMC] [[PubMed](#)] [[Google Scholar](#)]