



# REVIEW ON ANATOMY OF SCIATIC NERVE, ITS CLINICAL RELEVANCE AND ROLE OF HOMOEOPATHY

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**Abstract:** The sciatic nerve is the largest nerve in the human body arises at the lumbosacral plexus in the lower back, from the ventral rami of the L4, L5, S1, S2, and S3 spinal nerves and travels posteriorly through the lower limb to reach the foot. The sciatic nerve performs both sensory and motor functions. Sciatica refers to pain that travels along the path of the sciatic nerve. The sciatic nerve may be irritated, compressed, or inflamed by several problems in the lower back, causing sciatica. Homeopathy medicines are an effective way to treat sciatica pain. It not only rectifies the compression or irritation of the sciatic nerve but also helps in strengthening a patient's constitution so that the disease is cured of its roots and there are no further recurrences.

**Keywords:** Sciatic nerve, Sciatica, Tibial nerve, Common peroneal nerve, Deep Peroneal Nerve, Superficial Peroneal Nerve, Anatomy

## I. INTRODUCTION

The sciatic nerve is the largest nerve in the body, approximately 2 cm in diameter at the thickest part, it consists of both sensory and motor nerve fibers that arise at the lumbosacral plexus in the lower back, from the ventral rami of the L4–L5, S1–S3 spinal nerves and travels posteriorly through the lower limb to reach the foot. It is a composite nerve composed of tibial and peroneal components connected to each other through connective tissues. (1)

## II. ORIGIN:

Sciatic nerves arise from the lumbo-sacral plexus as a single nerve and consist of two branches in a single undivided trunk. The tibial portion originates from anterior preaxial branches of L4, L5, S1, S2, and S3 whereas common peroneal division originates from the postaxial branches of L4, L5, S1 and S2.



Fig: Origin of sciatic nerve (2)

### III. STRUCTURE AND COURSE:

The sciatic nerve leaves the pelvic cavity through the greater sciatic foramen inferior to the piriformis muscle as a thick single band and enters the gluteal region where it further descends between the greater trochanter and ischial tuberosity.

While entering along the back of the thigh, it is crossed over by long head of the biceps femoris muscle in posterior compartment of thigh and it lies on the posterior surface of adductor magnus.

A little above the popliteal fossa at junction of middle and lower thirds of the thigh, it divides into separate posterior tibial nerves and common peroneal nerves. However, in some individuals, division of the sciatic nerve may take place in sciatic region, in such cases tibial nerve leaves the pelvic cavity as usual, i.e., inferior to piriformis muscle but common peroneal nerve pierces the piriformis to enter the posterior compartment of the thigh.

The tibial component, before dividing, from medial side provides muscular branches to hamstring muscles and a muscular branch to the short head of biceps femoris arises from the common peroneal nerve component on lateral side.

After division in the lower part of middle of thigh, posterior tibial nerve enters the popliteal fossa vertically and provides articular branch to knee joint and another subcutaneous nerve which is called as Medial Sural Nerve lateral side of skin of leg. Then, it enters the posterior compartment of leg and give muscular branches to supply all flexor muscles of posterior compartment of leg.

Further, it enters the sole of the foot, inferior to medial malleolus through tarsal tunnel. Here, it while entering in the sole gives up a sensory branch called as Medial Calcaneal Nerve which supply to the skin of the heels.

Immediately after entering the sole, the posterior tibial nerve divides in to two terminal branches, namely, Medial plantar nerve, and Lateral plantar nerve, which innervates the four and fourteen muscles of the soles respectively. The skin of the sole of the foot received sensory cutaneous innervation from medial plantar nerve.

The common peroneal nerve enters the popliteal fossa laterally where it branches into two sensory cutaneous branches. First, sural communicating branch and another is Lateral cutaneous branch also called as Lateral sural nerve. The lateral sural nerve provides cutaneous supply to lateral half of calf area in posterior leg and to lateral border of foot, whereas sural communicating branch joins medial sural nerve.

Common peroneal nerve rolls around the neck of the fibula in the leg, thereafter, divides into two parts, Deep Peroneal Nerve (DPN) and Superficial Peroneal Nerve (SPN). Here, it pierces some fibers of the peroneal longus muscle.

DPN enters the anterior compartment of leg where it gives muscular branches to supply all extensor muscles. DPN is terminated in the foot into medial branch, that ends after giving supply to first cleft of dorsum of foot and lateral branch, that is further terminated as pseudoganglia.

SPN, also known as the musculocutaneous nerve of lower limb, enters the lateral compartment of leg where it gives muscular branches to supply the muscles of lateral compartment of the leg. SPN ends as cutaneous sensory branch in foot thereby, supplying to the dorsum of foot, except the first cleft which is supplied by DPN and nail pad which is supplied by the plantar nerve.

The sciatic nerve receives nutrients from the arterial blood supply, which are the branches from the external and internal iliac artery. The gluteal region receives blood supply from inferior gluteal artery and from the lateral and medial circumflex femoral arteries. In the lower part of the thigh, blood supply is received from the perforating branches profunda femoris arteries, which is a branch of common femoral artery. In the popliteal region, blood is supplied from the popliteal artery. The anterior part of the leg receives blood supply from the anterior tibial artery, posterior lateral portion of the leg receives blood supply from the posterior tibial artery. (3)

### IV. CLINICAL RELEVANCE AND APPLIED ANATOMY:

The sciatic nerve may be injured by penetrating wounds, posterior dislocation of the hip, fracture of the pelvis, total hip replacement surgery (1%), or misplaced therapeutic injection in the gluteal region, causing motor and sensory loss of the affected area.

If compression of posterior tibial nerve occurs in tarsal tunnel under the flexor retinaculum of the ankle. It clinically presents as pain and paresthesia in the sole of the foot, which often worsens at night. This condition is known as tarsal tunnel syndrome.

As the sciatic nerve leaves the pelvis, it sometimes passes through the piriformis muscle and at that point, it may become entrapped leading to piriformis syndrome producing symptoms similar to sciatica.

Injury to the common peroneal nerve due to fracture of the neck of the fibula or a tightly applied plaster cast may cause paralysis of muscles of anterior compartment of the leg results in foot drop due to which patient cannot stand on heel.

Sciatica is a symptom not a diagnosis. It is a term applied to a clinical condition characterized by shooting pain along with the numbness, altered sensation, and/ or weakness felt along the course of distribution of the sciatic nerve (e.g. buttock, posterior aspect of thigh, lateral aspect of leg, and dorsum of the foot). A problem with sciatic nerve may occur in the lower back due to compression and irritation of nerve at L4-S3 spinal nerve roots by herniated intervertebral disc of the lumbar vertebrae. A problem can also occur at the course of sciatic nerve in the thigh, leg, or foot. The symptoms are usually felt in the areas around and below the location where sciatic nerve is affected. When the roots of the nerve are affected then condition is called Lumber radiculopathy, when body of the nerve is affected along its course, the condition is called as sciatic neuropathy. Sciatica pain can occur almost anywhere along the nerve pathway. It's especially likely to follow a path from the low back to the buttocks and back of the thigh and calf. The pain can vary from a mild ache to a sharp, burning pain. Sometimes it feels like a jolt or electric shock. It can be worse when coughing, sneezing, or sitting for a long time. Sciatica generally affects only one side of the body. Some people may also experience numbness, tingling, or muscle weakness in their legs or feet. One part of the leg can feel pain, while another part can feel numb. (1,4-6)

#### V. FUNCTIONS:

Sciatic nerves perform motor and sensory functions. Motor branches (i) from undivided trunk, supply all the muscles of the back of thigh, which extend the hip and flex the knee. (ii) of the tibial nerve, supply the muscles of the leg, which flex the leg and muscles of the foot, which plantar flex the foot; (iii) of the common peroneal nerve, supply muscles of the leg which dorsiflex the foot. The sensory branches (i) of the tibial nerves. supply the skin on the back of the calf, medial and lateral sides of the heel, lateral border of the foot, and whole of the sole; (ii) of the common peroneal nerve, supply the skin on the anterolateral and lateral surfaces of the leg and whole of dorsum of the foot except the area which is supplied by the plantar nerve. (07-08)

#### VI. HOMOEOPATHY MEDICINE:

Homoeopathy medicines are effective for treating sciatica pain. It not only rectifies compression or irritation on the sciatic nerve but also helps in strengthening a patient's constitution so that the disease is cured of its roots and there are no further recurrences.

Homoeopathic remedies are selected based on the individual's specific symptoms and overall health. Here are a few remedies that may be considered for sciatica pain: <sup>(9-14)</sup>

***Belladonna***: Indicated for acute, sudden, and severe sciatic pain, which is shooting along with intense throbbing, that worsens with movement. Pain is usually accompanied by redness, heat, and inflammation in the affected area.

***Bryonia Alba***: Works well for sciatica on the right side when pain is tearing and stitching in nature and is aggravated by motion and becomes more intense after exertion during the summers. Pain is better when lying on painful side, by pressure, by absolute rest. Pain is usually accompanied by dryness of mouth and an increase in thirst for large quantity of cold water.

***Colocynthis***: Indicated for sciatica on the left side. The principal feature of the *colocynthis* is severe, tearing, neuralgic sciatic pain—so severe that the patient is unable to keep still. Pain originates in the lumbar and gluteal regions and travels to the feet. Modality: Pain improves with motion; hard pressure and heat worsen during rest. The *colocynthis* generally cures sciatica when seen after anger and indignation.

***Gnaphalium***: Indicated for sciatic pain due to nerve compression, an excellent remedy of unquestioned benefit in sciatica, when tingling and shooting pain in the leg and feet is associated with numbness, coldness, and weakness of the affected part. Sciatic pain alternates with numbness of the part. Modality: Pain is relieved by lying down and bending the affected limb which compels the patient to fold the knee and thigh towards the abdomen.

***Hypericum Perforatum***: is well indicated in Sciatica when there is nerve damage or injury, such as from a fall or trauma resulting in shooting or stabbing pains along the sciatic nerve along with numbness or tingling sensations in the affected area. Modality: Pain is aggravated by motion, especially bending backward, and ameliorated from pressure and warmth.

***Magnesia phosphorus***: beneficial for right-sided sciatic neuralgia mostly with spasmodic muscular contractions. Discomfort radiates from the right side of lower back, right hip, thigh and then towards the back of knee up to the right leg. Hot fomentation and pressure can help reduce discomfort. The patient remains perfectly well during day and worse at night.

***Rhus Tox***: Excellent medicine for sciatica with tearing, drawing pains in the lower limbs, and violent pain in the back, particularly in the lumbar region, as if the back were broken. It is a remedy for patients who experience sciatica after getting wet in cold, damp weather, from over lifting the weight, and from suppressing the sweat. Modality: Pain

is ameliorated by continuous motion during the day and is aggravated at night when lying down; pain, stiffness worsens in the morning when beginning to move or rising from the seat.

**Ruta:** is well indicated after injury to the lumbar region. It relieves bruising or soreness along the sciatic nerve after trauma and facilitates quick recovery from an injury or fracture of lumbo-sacral vertebrae. Modality: sciatic pain is aggravated by sitting or lying down for extended periods.

**Valeriana officinal:** Indicated for sciatic pain characterized by violent, drawing, jerking. pains in lower limbs and hip, along with tearing pain in the muscles of the thighs radiating up to the hip. Tearing pain is also felt in the calf when crossing the limbs. Modality: Sciatic pain is aggravated during standing and during rest and ameliorated on walking.

**Kali Iod:** is indicated for sciatica with muscle weakness and stiffness, particularly in the lower back and buttocks. It is beneficial when pain is aggravated by cold weather or damp conditions.

**Guaiacum:** Guaiacum is a deep-acting remedy, deep enough to cure the symptoms of inherited phthisis. Pain is characterized by stitching and burning in the course of the sciatic nerve. Limbs are contracted and stiff due to the prolonged sciatic pain. Drawing pain is felt in the thigh, which extends to the knee and leg and associated with weakness and numbness of the lower limb. The knee is flexed during contraction of hamstrings, and right leg becomes swollen and drawn close to the thigh.

## VII. CONCLUSION:

Homoeopathic medicines, which are natural and safe, work on the root cause of sciatica and provide complete, effective healing and cure. Medicine selection is based on the totality of symptom and law of individualization after detailed case taking.

For differential diagnosis of the sciatica and for selection of homoeopathic medicine to achieve desirable results in patients, clinicians should have thorough knowledge of the anatomy of the sciatic nerve and its clinical relevance is of prime importance as other nerves like femoral and obturator nerve also emerges from the plexus of lumbar vertebrae.

Furthermore, changes in lifestyle like correcting the posture while standing or sitting, weight loss, choosing a stiffer mattress and sleeping with a body pillow between your knees, can help significantly with sciatica pain management and possibly expedite the healing process when combined with homoeopathic remedies.

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