

**THE WIDTH OF THE SCIATIC NERVE IN THE HIMACHALI POPULATION -A
CADAVERIC STUDY****Dr. Amit Raj Sharma***

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ABSTRACT

The sciatic nerve is the thickest nerve of the body.^[1] It is formed by the tibial and common peroneal components in a single sheath and divides into the tibial and common peroneal nerves at the apex of the popliteal fossa; however, the level of bifurcation can be variable.^[2] The width of the sciatic nerve is different at different levels. The knowledge of the width of the sciatic nerve at different levels is important in anaesthesia, orthopaedics, rehabilitation, and neurology.^[3] The study was done by dissection of forty human adult lower limb specimens, irrespective of sex from the Department of Anatomy, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India. During dissection, we found the minimum length of the sciatic nerve was 4.27 cm and the maximum length of the sciatic nerve was 36.07 cm. The length of the sciatic nerve depends on the level of division. Knowledge about the length of the sciatic nerve is important for clinicians and surgeons.

KEYWORDS: Sciatic nerve, the tibial, common peroneal nerves, width of the nerve.**INTRODUCTION**

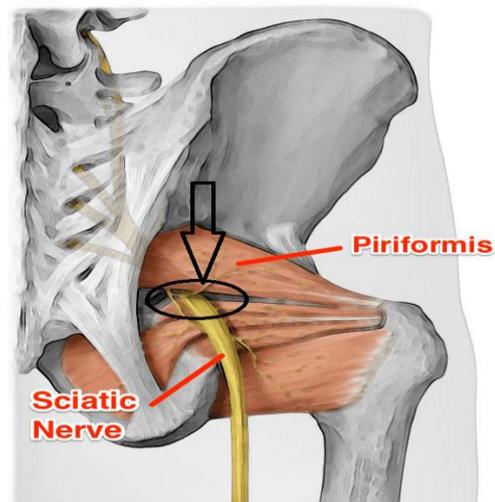
The Sciatic nerve is the largest and thickest nerve of the human body, also known as the ischiadic nerve or ischial nerve.^[1] The knowledge about the width of the sciatic nerve at different levels will be useful for surgeons, anaesthetists and orthopedicians. The understanding of normal anatomy of the gluteal region and the sciatic nerve is essential for professionals to be cautious and plan various surgical interventions in this region eg: sciatic nerve block, total hip arthroplasty, posterior hip surgeries, sciatic nerve decompression, deep intramuscular gluteal injections.

MATERIALS AND METHODS

The study was conducted in the Department of Anatomy, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India. We performed our study in Forty (twenty right and twenty left limbs) formalin-fixed adult cadaveric lower limbs, irrespective of sex. The pelvic, gluteal region and posterior aspect of the thigh were dissection according to Cunningham's manual.

The Width of The Sciatic Nerve Was Studied At Two Levels**First Level - Inferior Border of Piriformis**

The width of the sciatic nerve was measured at the point of emergence of the nerve in the gluteal region i.e., the lower border of the piriformis muscle using standard Vernier calliper, the results were given in millimetres.

**Figure No1: Inferior Border of Piriformis Muscle (Posterior View).**

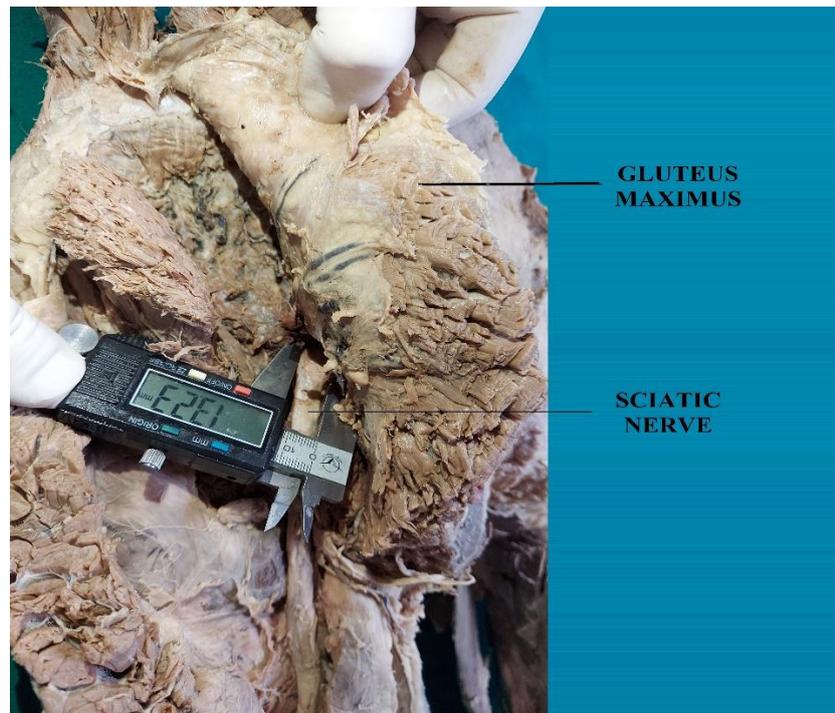


Figure No 02: The Width of The Sciatic Nerve At The Inferior Border of The Piriformis Muscle.

SECOND LEVEL- BETWEEN GREATER TROCHANTER AND THE ISCHIAL TUBEROSITY

We drew an imaginary line (with the help of non-stretchable thread) between greater trochanter and the

ischial tuberosity, the width of sciatic nerve was measured at this level using standard Vernier calliper and the results were given in millimetres.



Figure No 03: The Width of The Sciatic Nerve Between The Greater Trochanter and The Ischial Tuberosity.

OBSERVATION AND RESULTS**FIRST LEVEL - INFERIOR BORDER OF PIRIFORMIS**

The width of the sciatic nerve was measured using standard Vernier calliper, the results are given in millimetres.

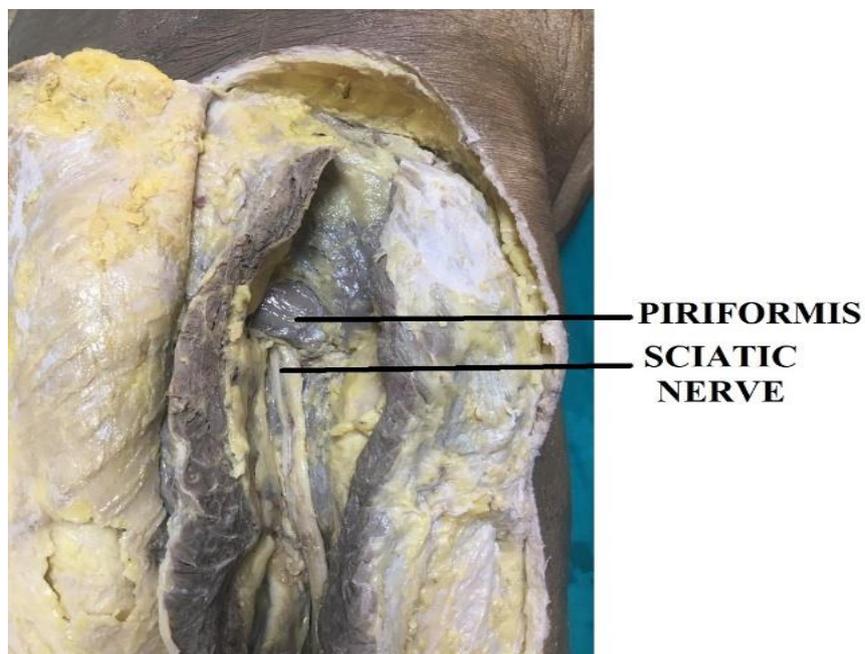


Figure No 04: Width of Sciatic Nerve.

a). WIDTH OF RIGHT SCIATIC NERVE AT FIRST LEVEL

The minimum width of the right sciatic nerve was 9.7mm, the maximum width of the right sciatic nerve was 27.86 mm and the mean width was 16.63 mm.

Table No 1: Width Of Right Sciatic Nerve At First Level.

WIDTH OF RIGHT SCIATIC NERVE AT INFERIOR BORDER OF PIRIFORMIS	VALUES (mm)
MINIMUM	9.7
MAXIMUM	27.86
MEAN	16.63
STANDARD DEVIATION	± 4.86

b). WIDTH OF LEFT SCIATIC NERVE AT FIRST LEVEL

The minimum width of left sciatic nerve was 11.38 mm, the maximum width of the left sciatic nerve was 22.05 mm and the mean width was 17.82 mm.

Table No 2: Width Of Left Sciatic Nerve At First Level.

WIDTH OF LEFT SCIATIC NERVE AT INFERIOR BORDER OF PIRIFORMIS	VALUES (mm)
MINIMUM	11.38
MAXIMUM	22.05
MEAN	17.82
STANDARD DEVIATION	± 3.66

Student's t-test was applied to compare measurements between right and left side. However, the width of sciatic

nerve at first level showed ($p = 0.36$) i.e., insignificant difference ($p > 0.05$).

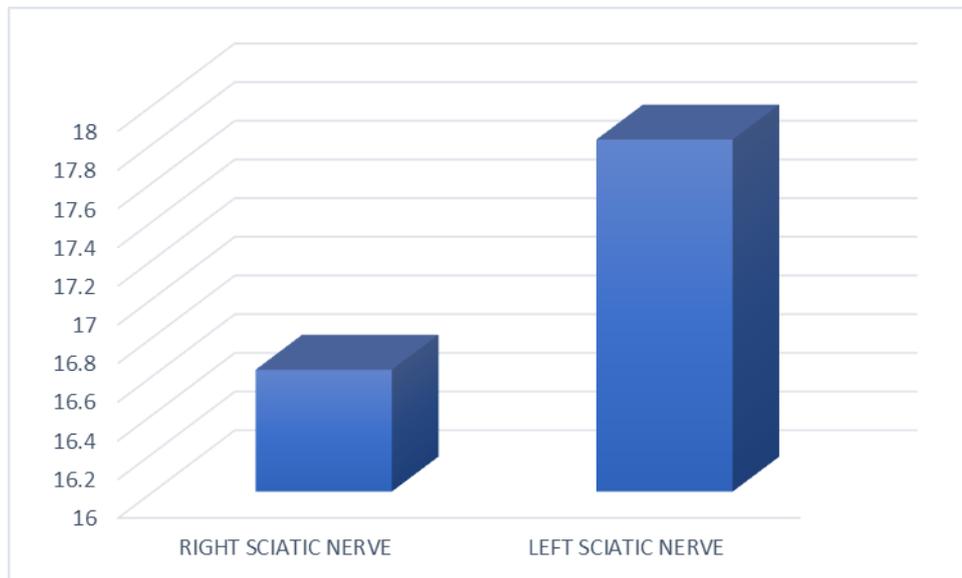


Figure No 05: Histogram Showing The Width Of Right And Left Sciatic Nerve At The First Level.

SECOND LEVEL- BETWEEN GREATER TROCHANTER AND THE ISCHIAL TUBEROSITY

The width of sciatic nerve was observed between greater trochanter and the ischial tuberosity. An imaginary line

was drawn (with the help of non-stretchable thread) between these points and the width of sciatic nerve was measured in millimetres using standard Vernier calliper.

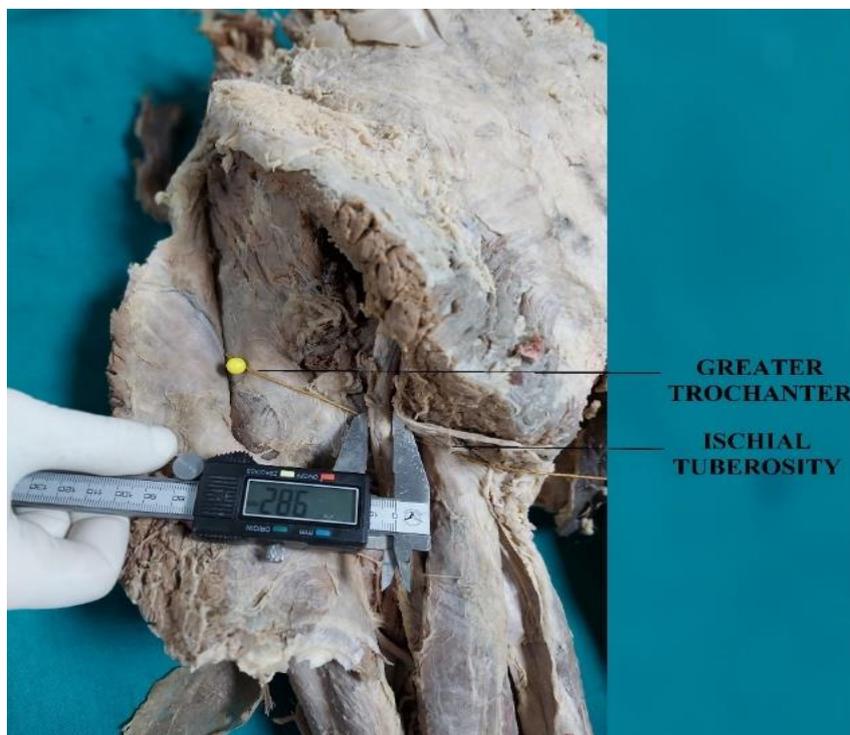


Figure No 06: Width of Sciatic Nerve.

a). WIDTH OF RIGHT SCIATIC NERVE AT SECOND LEVEL

The minimum width of the right sciatic nerve was 8.57 mm, the maximum width of the right sciatic nerve was 22.62 mm and the mean width was 18.65 mm.

Table No 3: Width of Right Sciatic Nerve At Second Level.

WIDTH OF RIGHT SCIATIC NERVE BETWEEN GREATER TROCHANTER AND THE ISCHIAL TUBEROSITY	VALUES (mm)
MINIMUM	8.57
MAXIMUM	22.62
MEAN	18.65
STANDARD DEVIATION	± 4.68

B. WIDTH OF LEFT SCIATIC NERVE AT SECOND LEVEL

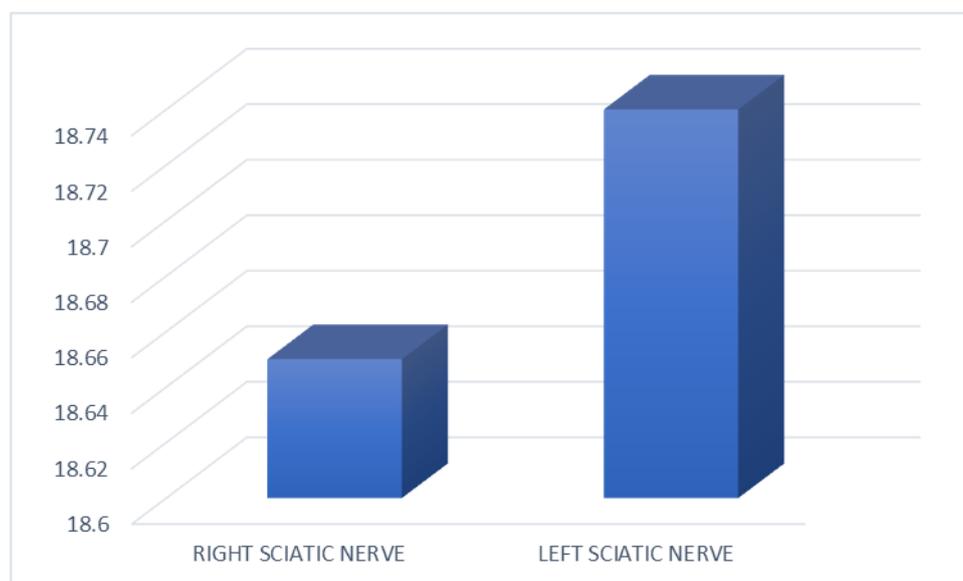
The minimum width of left sciatic nerve was minimum 8.90mm, the maximum width of left sciatic nerve was 23.08mm and the mean width was 18.74 mm.

Table No 4: Width of Left Sciatic Nerve At Second Level.

WIDTH OF LEFT SCIATIC NERVE BETWEEN GREATER TROCHANTER AND THE ISCHIAL TUBEROSITY	VALUES (mm)
MINIMUM	8.90
MAXIMUM	23.08
MEAN	18.74
STANDARD DEVIATION	± 4.67

Student's t-test was applied to compare measurements between right and left side. However, the width of sciatic

nerve at second level showed ($p = 0.52$) i.e., insignificant difference ($p > 0.05$).

**Figure No 07: Histogram Showing The Width Of Right And Left Sciatic Nerve At The Second Level.****DISCUSSION**

The width of sciatic nerve was observed at two levels.

1. FIRST LEVEL - INFERIOR BORDER OF PIRIFORMIS**2. SECOND LEVEL- BETWEEN GREATER TROCHANTER AND THE ISCHIAL TUBEROSITY****1. FIRST LEVEL - INFERIOR BORDER OF PIRIFORMIS**

The sciatic nerve block is commonly used for lower limb surgeries. There are several methods and approaches and hence knowledge about the dimensions and course of sciatic nerve in the gluteal region is very important.

Previous studies have suggested that the local anaesthetic injected into the subgluteal space under ultrasound guidance is effective in producing sciatic nerve block, therefore the surface marking for the topographic relation of the sciatic nerve becomes important.

In the present study, we measured the width of the sciatic nerve at the lower border of the piriformis muscle in the gluteal region in millimetres by standard Vernier calliper. In forty limbs (twenty right and twenty left limbs) we found the minimum width of the right sciatic nerve as 9.7mm, the maximum width of the right sciatic nerve was 27.86 mm and the mean width was 16.63 mm. The minimum width of the left sciatic nerve was 11.38

mm, the maximum width of the left sciatic nerve was 22.05 mm and the mean width was 17.82 mm.

On comparing the results of previous studies, it was observed that the average width of the sciatic nerve in

different populations was 18.68 mm. The maximum width of 22.32 mm was observed in the Brazilian study and maximum of 14.00 mm in the South Indian Population. Large variations were not present.

Table No 5: Width of Sciatic Nerve At The Level of Inferior Border of Piriformis As Reported By Various Authors.

Sr. no	Authors	Ethnic Group	Mean width
01	Van de et al (2001) ^[44]		20.00 mm
02	Vicente et al (2007) ^[48]	Brazilian population	18.85 mm on right side 22.32 mm on left side
03	Marieb et al (2012) ^[45]		20.10 mm
04	Williams et al (2005) ^[43]	North-eastern United States	20.00 mm
05	Krzysztof A et al (2016) ^[76]	Czech Republic	15.55 mm
06	Prameela et al (2015) ^[40]	South Indian population	14.00 mm
07	Present study	Himachali population (Indian population)	16.63 mm on right side 17.82 mm on left side

It will serve as a guide to prevent injuries during deep intramuscular injection in the gluteal region. Thus, as per these observations, we can conclude that the width of the sciatic nerve at level one in the Himachali population / Indian population is marginally less as compared to the other population. The knowledge about the probability of anatomical variation in the width of the sciatic nerve will help in a better understanding of the symptoms caused by sciatic nerve compression. The present study provides awareness of variations in the width of the sciatic nerve in the Himachali population.

2. SECOND LEVEL- BETWEEN GREATER TROCHANTER AND THE ISCHIAL TUBEROSITY

The width of the Sciatic nerve is important as knowledge about it will help in preventing iatrogenic, sciatic nerve injury during deep intramuscular injections and sciatic nerve blocks, The posterior approach to the sciatic nerve combined with a lumbar plexus block provides a complete anaesthesia of the lower extremity. The different approach to the Sciatic nerve is the Raj technique^[10] in which the hip and knee are both flexed at 90 degrees. Flexion of the hip in this way, flattens the gluteal muscles and the sciatic nerve becomes superficial. The greater trochanter and ischial tuberosity are palpated and a line is drawn connecting them. A 10

cm needle is inserted at the midpoint of this line, at a perpendicular angle to the skin.

In the present study, we drew an imaginary line (with the help of a non-stretchable thread) between the greater trochanter and the ischial tuberosity, The width of the sciatic nerve was measured at this level by using a standard Vernier calliper and the results were given in millimetres. We found that of forty embalmed lower limbs (twenty right and twenty left) the minimum width of the right sciatic nerve at this level was 8.57 mm, the maximum width of the right sciatic nerve was 22.62 mm and the mean width was 18.65 mm. The minimum width of left sciatic nerve at this level was 8.90mm, the maximum width of the left sciatic nerve was 23.08mm and the mean width was 18.74 mm.

Previous studies on the width of the sciatic nerve at level II have been done by authors like Williams et al (2005)^[11], Gabrielli et al (1994)^[12] and they reported more width of the sciatic nerve as compared to our findings. While Prameela et al (2015)^[9], Sangeetha G et al (2019)^[13] and Rajalakshmi et al (2015)^[14] have done the research on South Indian Population and they reported width less than our finding. Vicente et al (2007)^[5] in the Brazilian population reported the same finding as ours.

Table No 6: Width of Sciatic Nerve Between Greater Trochanter And Ischial Tuberosity As Reported By Various Authors.

Sr. no	Authors	Ethnic groups	Mean width on right side	Mean width on left side
01	Gabrielli et al (1994) ^[12]	Japanese population	21.82 mm	20.95 mm
02	Williams et al (2005) ^[11]	North-eastern United States	26.46 mm	29.68 mm
03	Vicente et al (2007) ^[5]	Brazilian population	18.85 mm	22.32 mm
04	Prameela et al (2015) ^[9]	Indian population	10.6 mm	9.7 mm
05	Rajalakshmi et al (2015) ^[14]	South Indian population	8.8 mm	7.8 mm
06	Sangeetha G et al (2019) ^[13]	South Indian population	8.8 mm	7.8 mm
07	Present study	Himachali population (Indian population)	18.65 mm	18.74 mm

We found that the width of the sciatic nerve at this point in the Himachali population was less as compared to the foreign population but it is more than the South Indian Population. The knowledge about the probability of anatomical variation in the width of the sciatic nerve (at this level) is very important because here the sciatic nerve is very superficial and it can be compressed at this point in immobilized patients. On the basis of this evidence, we can advise the patient to use a water bed / surgical bed, proper physiotherapy and change the posture from time to time to avoid the compression of the sciatic nerve at this level. The present study provides awareness of variations in the width of the sciatic nerve in the Himachali population.

CONCLUSION

The present study will be of great clinical importance for surgeons as well as for patients to decrease morbidity.

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