

ANATOMICAL VARIATIONS OF SCIATIC NERVE - A CADAVERIC STUDY

Venkata Chandrika Pitta^{1,a}, Lakshmi Durga Jakka^a and Vijayalakshmi Devi Athota^b

^a Assistant Professor, Department Of Anatomy, Guntur Medical College, Guntur, Andhra Pradesh, India, ^b Assistant Professor, Department Of Anatomy, Siddhartha Medical College, Vijayawada, Andhra Pradesh, India

ABSTRACT Introduction: Sciatic nerve arises from the lumbosacral plexus. It divides into tibial and common peroneal nerves from the pelvis to the popliteal region. The sciatic nerve usually exits from the gluteal region below the piriformis muscle. Variations in the course and level of sciatic nerve division are well documented in the literature. **Aim:** The study aims to evaluate for variations in the relationship between the piriformis muscle and sciatic nerve and the variations in the level of division of the sciatic nerve. **Materials and Methods:** This study was done on 80 lower limbs of the 40 embalmed cadavers during routine anatomical dissections in the Department of Anatomy, Siddhartha Medical College, Vijayawada. Regions were dissected according to the guidelines, and variations in sciatic nerve course and division level were noted. **Results:** In this study, we noted that relationships between the sciatic nerve and piriformis muscle are of type A in 82.50%, type B in 8.75%, type C in 5.0%, type D in 2.5% and rare type G in 1.25%. Concerning the sciatic nerve division level, these are type I at 28.75%, type II at 8.75%, type III at 6.25%, type IV at 3.75% and type V at 52.5%. **Conclusion:** The study establishes the variations in sciatic nerve relationship with the piriformis muscle and its division level in the south Indian population. These are important to understand the variable symptoms in cases of sciatic nerve injury or compressions, complications during surgeries on the gluteal region and also sciatic nerve block anaesthesia.

KEYWORDS Sciatic nerve, Tibial nerve, Common peroneal nerve, Piriformis muscle.

Introduction

Sciatic is the Greek word derived from "Ischiadicus", also known as ischiatic nerve or ischiatic nerve (1). The sciatic nerve is the largest and thickest nerve of the body, measuring 0.5cm thick and 2cm wide at its origin. It carries ventral rami of L4 to S3 spinal nerves. Classically the nerve exits the gluteal region inferior to the piriformis muscle between the greater trochanter and ischial tuberosity and descends along the posterior aspect of the

thigh, and divides into the tibial nerve (consists of ventral divisions of anterior primary rami of L4, L5, S1, S2, S3) and common peroneal nerve (consists of dorsal divisions of anterior primary rami of L4, L5, S1, S2) at the apex of popliteal fossa (2). Tibial nerve supplies muscles in the posterior compartments of the thigh and leg along with sole muscles. Common peroneal nerve supplies muscles of the lateral and anterior leg compartments, dorsum of the foot and short head of the biceps femoris (3).

Sciatic nerve compression results in sciatica and piriformis syndrome. Piriformis syndrome mimics sciatica symptoms, usually by sciatic nerve entrapment by pathological or rarely anomalous piriformis muscle against the bony pelvis. Some researchers believe variant sciatic nerve anatomy could be an underlying aetiology (4). This accounts for about 6% of low back pain cases (5). In addition to piriformis syndromes, other clinical conditions like postoperative sciatic palsy (a rare complication of hip surgery) and failure of sciatic nerve block are secondary to the anatomical variations of the sciatic nerve (6). There are reported variations in the division of the sciatic nerve into its branches

Copyright © 2023 by the Bulgarian Association of Young Surgeons

DOI: 10.5455/IJMRCR.172-1668441123

First Received: November 14, 2022

Accepted: April 1, 2023

Associate Editor: Ivan Inkov (BG);

¹Corresponding author: Venkata ChandrikaPitta, Assistant Professor, Department of Anatomy, Guntur Medical College City Guntur, Andhra Pradesh, India

This is an open access article under the CC BY-NC-SA license
(<https://creativecommons.org/licenses/by-nc-sa/4.0/>).

from the pelvis level up to the popliteal fossa. This can cause the failure of sciatic nerve block, nerve compression and variable symptoms and severity in cases of nerve injuries, it depends upon the level of bifurcation. Therefore, understanding and having prior knowledge about these anatomical variations is essential to avoid complications during surgical procedures.

This study aims to provide comprehensive cadaveric anatomical knowledge about the variations of the sciatic nerve concerning the relationship with the piriformis muscle and the level of the division present in the south Indian population.

Materials and Methods

This study was conducted in 80 gluteal and posterior aspects of thigh regions of 40 embalmed human cadavers, of which 27 males and 13 females were dissected during routine anatomical dissections in the Department of Anatomy, Siddhartha Medical College, Vijayawada, in a span of seven years.

The gluteal region is dissected up to the gluteal muscles. It is followed by a reflection of the gluteus maximus muscle from its origin to view the piriformis muscle and sciatic nerve. The variations of the division of the sciatic nerve, abnormality of piriformis muscle anatomy, if any and their relation with each other were observed in all specimens and noted in detail. Then the posterior compartment of the thigh was dissected, and the long head of the biceps tendon was separated from the semitendinosus muscle to expose the sciatic nerve in the posterior compartment of the thigh. Next, dissection is extended inferiorly up to the popliteal fossa to evaluate the sciatic nerve's bifurcation level. The level of bifurcation of the sciatic nerve is carefully documented and photographed. The results are then evaluated and compared with previous studies described in the literature.

Results

In the current study dissection of 40 embalmed cadavers comprising 80 lower limbs was done on gluteal regions and the posterior aspect of the thighs. The normal nerve-muscle relationship, the sciatic nerve passing inferior to the piriformis muscle, is noted in 66 specimens out of 80 (82.5%). The rest of the cadavers show variations as described in the literature. In 7 (8.75%) out of 80 specimens nerve is seen dividing within the pelvis the common peroneal nerve piercing the piriformis muscle and the tibial nerve passing inferior to the muscle to exit the gluteal region. The sciatic nerve is seen dividing in the pelvis, with the common peroneal nerve passing above the piriformis muscle and the tibial nerve passing below the muscle in 4 (5.0%) out of 80 specimens. In 2 (2.5%) out of 80 specimens, the undivided sciatic nerve is seen passing by, piercing the piriformis muscle to enter the posterior compartment of the thigh. In the remaining 1 (1.25%) specimen, the sciatic nerve is seen dividing within the pelvis. Both the tibial and common peroneal nerves pass below the piriformis muscle to exit the gluteal region. This is the rare variation described in very few studies.

The bifurcation of the sciatic nerve is noted from the gluteal region up to the popliteal fossa in dissected specimens. In 42 (52.5%) out of 80 specimens, the sciatic nerve is seen dividing into the common peroneal and tibial nerves at the apex of the popliteal fossa. Our study's next common division level is within the pelvis before its exit from the gluteal region, which was observed in 23 (28.75%) specimens. In 7 (8.75%) out of 80 specimens, the division level is within the gluteal region. In 5 (6.25%)



Figure 1 Undivided sciatic nerve passes below the piriformis muscle. This corresponds to the type A relationship between nerve and muscle.

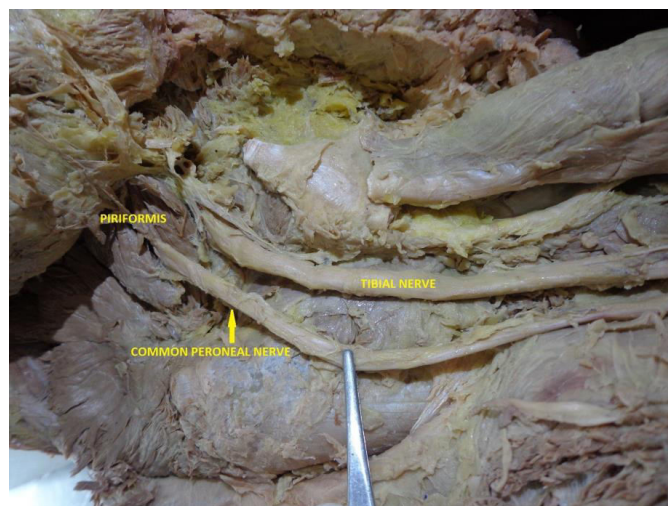


Figure 2 Sciatic nerve divided in the pelvis with common peroneal nerve piercing the piriformis muscle and tibial nerve passing below the muscle. This corresponds to the type B relationship between the nerve and muscle.

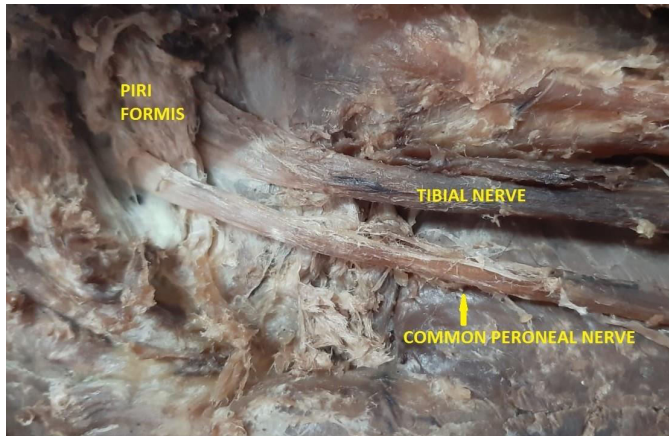


Figure 3 Sciatic nerve is divided within the pelvis and the common peroneal nerve passing above the piriformis muscle and the tibial nerve passing below it. This corresponds to the type C relationship between the nerve and muscle.



Figure 5 The sciatic nerve divides within the pelvis with both tibial and common peroneal nerves passing below the piriformis muscle.



Figure 4 Undivided sciatic nerve passes piercing the piriformis muscle. This corresponds to the type D relationship between the nerve and muscle.



Figure 6 Sciatic nerve divides within the pelvis, this corresponds to Type I division of a sciatic nerve.



Figure 7 Sciatic nerve divides within the gluteal region, this corresponds to the Type II division of a sciatic nerve.

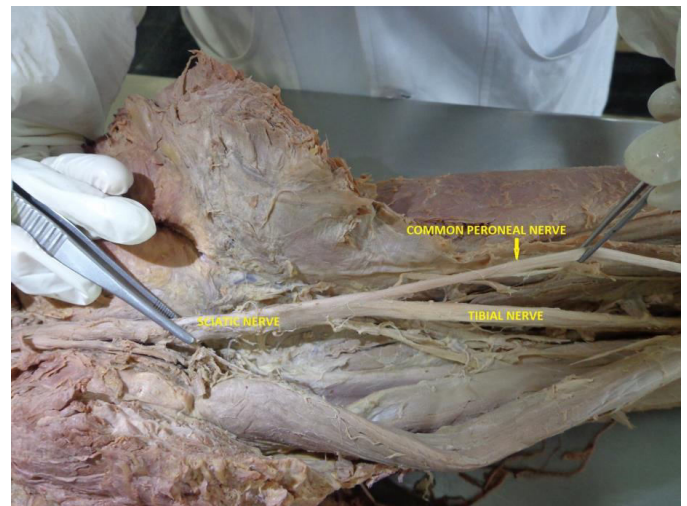


Figure 9 Sciatic nerve divides at the middle part of the posterior compartment of the thigh, this corresponds to Type IV division of a sciatic nerve



Figure 8 Sciatic nerve divides at the upper part of the posterior compartment of the thigh, this corresponds to the Type III division of the sciatic nerve.



Figure 10 Sciatic nerve divides at the lower part of the posterior compartment of the thigh / at the apex of the popliteal fossa, this corresponds to the Type V division of a sciatic nerve.

out of 80 specimens, the division level is at the upper part of the posterior compartment of the thigh. In the remaining 3 (3.75%) specimens, the division level is at the mid part of the posterior compartment of the thigh.

Discussion

In 85 to 89% of cases, the undivided sciatic nerve usually passes through the greater sciatic foramen below the piriformis muscle and divides at the apex of the popliteal fossa (7). The variations of piriformis muscle anatomy, the course of the sciatic nerve, and their strange relationship with each other may lead to abnormal compression and entrapment of the sciatic nerve resulting in the piriformis syndrome. Diagnosis of this condition is quite challenging as the clinical symptoms mimic sciatica and there are no definitive imaging findings and tests for diagnosing this. Piriformis syndrome patients usually present with pain in the buttocks and along the back of the thigh and it usually mimics discogenic pain (8).

Beaton and Anson (1937) with their extensive observations on 120 specimens (1937) and 240 specimens (1938) classified the structural variations of Sciatic nerves and their anatomical relationship into different types as follows (9):

Type A: Undivided sciatic nerve passes below the piriformis muscle

Type B: Division of sciatic nerve within the pelvis with common peroneal nerve piercing the piriformis muscle and tibial nerve pass below the muscle

Type C: Division of sciatic nerve within the pelvis with the common peroneal nerve passes above and tibial nerve passes below the piriformis muscle

Type D: Undivided sciatic nerve passes piercing the piriformis muscle.

Type E: Division of sciatic nerve within the pelvis with the common peroneal nerve passes above the piriformis and tibial nerve passes piercing the muscle

Type F: Undivided sciatic nerve passes above the piriformis muscle

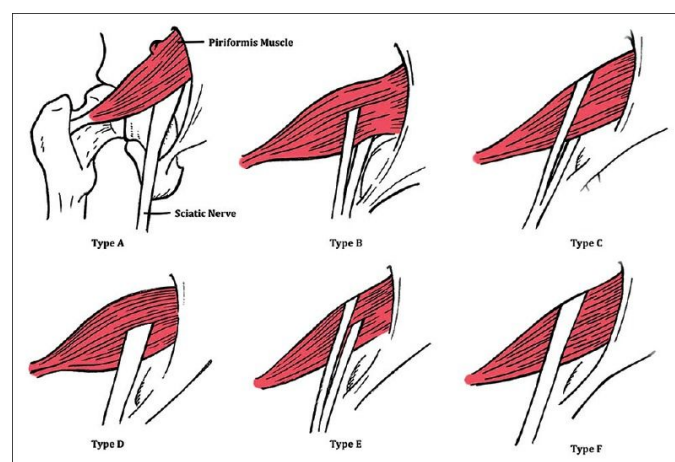


Figure 11 Beaton and Anson classification of the nerve-muscle relationship.

Additionally, Type G, described by Tomaszewski in which the sciatic nerve is divided within the pelvis and both tibial and common peroneal nerves exit below the piriformis muscle (10). (Figure 11): Beaton and Anson's classification of the nerve-muscle relationship The study done by Beaton and Anson in 1938 in 240 cadavers, 90% show sciatic nerve passing below the piriformis muscle and the rest of 10% show other variations (11). In the published literature, the range of piriformis and sciatic nerve relationship anomalies is between 1.5 to 35.8% (12).

In the study by Ameet Kumar Jha et al., Nepalese cadavers found that out of the 40 dissected gluteal regions, 92.5% are of type A and 2.5% are of type B, respectively, and 5% are of type C nerve muscle relationships (13). A study on the Indian population by Adibatti et al. reported type A in 92%, type B in 2% and type C in 6% of cadavers in the total 50 dissected gluteal regions (14). In their study by Desalegn et al. on 36 gluteal regions in the northern Ethiopian population, 91.7% show type A, 2.8% show type B and 5.5% show type C nerve-muscle relationship (15).

R Haladaj et al., in their study on Polish cadavers, reveal that 76.7% belong to type A, 20% to type B and 3.3% to type C nerve-muscle relationship (16). In an Ethiopian study by Berihu et al., 56 cadavers noted that 89.3% show type A, 8.9% show type B and 1.9% show type C nerve-muscle relationship (17). According to Pokorny et al., in their extensive research on Czech Republic cadavers found that 79.1% are of type A, 14.3% are of type B, 4.4% are of type C, and 2.2% are of type D nerve-muscle relationship (18).

A large study done by Sinha et al. on 100 Indian cadavers revealed that 85% are of type A, 9% are of type B, 3% are of type C, and 3% are of type D nerve muscle relationships (20). In Turkey, O Sulak et al. did extensive research on 400 fetal cadavers and found that 98% show a type A relationship, 1.2% show type B and 0.8% show a type C nerve-muscle relationship (21). In another study done on the Indian population by Saritha S et al., 91 cadavers show type A nerve muscle relation in 79.1% of specimens, type B in 14.3% and type D in 2.2% (1).

The study by Konstantinos Natsis et al. found that of the total specimens, 89.8% are of type A, 9% are of type B, and 1% each of type C, D & F (22). Kathe Dinesh Prakash et al., in their

The study found that 75% of specimens show type A and 2% show type D nerve-muscle relationship (23). An another large study by Natsis et al. on 290 Greek cadavers found extremely rare type F relationships in 0.35% (24). Smoll reviewed the multiple cadaveric studies comprising over 6000 lower limbs from various studies done from the late 1800s to 2009 and found that the incidence of type A is 83.1%, type B is 13.7%, type C is 1.3%, type D is 0.5%, type E is 0.08% and type F is 0.08%. He also found that types D, E and F are not found in the four largest studies (12). Another study by Ugrenovic et al. on 100 fetuses found that type A nerve muscle relation is seen in 96%, type B in 2.5% and type C in 1.5% (25). In this study relationship between the sciatic nerve and piriformis muscle is of type A in 82.5%, type B in 8.75%, type C in 5.0%, type D in 2.5% and rare type G in 1.25%. These are in near correlation with studies done by Ameet Kumar Jha et al., Adibatti et al., Saritha S et al., Sinha et al., Berihu et al., O Sulak et al., and a large meta-analysis done by Smoll. The most common type of relationship is Type A in our study, similar to all other studies published in the literature. However, E and F relationships are not seen in our study type. In addition, this study shows a type G relationship in one lower limb, which was rarely described in the literature.

During early embryological development, the lower limb's

Table 1 Showing a level of division of sciatic nerve by various studies.

S.No.	Name of the researcher	Number of the lower extremities involved in the study	Level of division of sciatic nerve (in percentage)	
			Before exiting pelvis	After exiting pelvis
1	Beaton LE et al., (32)	120	15	85
2	Gabrielli C et al.,(33)	80	13.7	86.3
3	Ugrenovic S et al.,(25)	200	4	96
4	Pokomy et al., (34)	182	20.9	79.1
5	Guvencer M et al., (35)	50	48	52
6	Ogeng'o JA et al., (36)	164	20.1	79.9
7	Patel S et al., (37)	86	8.2	91.8
8	Adibatti M et al., (14)	50	8	92
9	Dhivya S et al., (38)	64	1.56	98.44

two nerve plexuses (lumbar and sacral) are seen at the base of the lower limb buds. Later they are subdivided into dorsal and ventral components. The fusion of large dorsal and ventral components forms the sciatic nerve. However, they maintain their identity throughout their extension, although they are joined together to form a single nerve by a common connective tissue sheath (26). The level at which common connective tissue wrapping ends determine the level of sciatic nerve branching. The sciatic nerve is divided into branches at variable levels in the gluteal region and back of the thigh. Based on the level of division of the sciatic nerve, it is grouped into 6 groups (27)

- Groupe I : Sciatic nerve divides into tibial and common peroneal nerves within the pelvic region.
- Groupe II : Sciatic nerve divides within the gluteal region.
- Groupe III : Sciatic nerve divides at the upper part of the posterior compartment of thigh.
- Groupe IV : Sciatic nerve divides at the middle part of the posterior compartment of the thigh.
- Groupe V : Sciatic nerve divides at the lower part of the posterior compartment of the thigh.
- Groupe VI : Sciatic nerve divides in the popliteal fossa.

In the study done by Azza I Farag et al., on 30 cadavers, 10% show group I division, 26.6% show group II division, 16.6% show group III division, 30% show group IV division and 16.6% show group V division (28). Prakash et al., in their study on 86 lower extremities, showed 16% in group I, 2.3% in group II, 3.5% in group III, 2.3% in group IV, 40.7% in group V and 34.9% in group VI. In their study, the most common level of bifurcation is at the apex of the popliteal fossa (27).

In the Sawant SP et al. study, variations in the sciatic nerve division showed 22% in group I, 2% in group II, 3% in group III, 12% in group IV, 53% in group V and 8% in group VI.

In their study, the most common level of bifurcation is at the apex of the popliteal fossa (29). In the

A study done by Mayan Kumar D Javia et al. on the Indian population showed variations in the level of division of sciatic nerve are grouped as 23.53% in group I, 3.92% in group II, 1.96% in group III, 2.95% in group IV, 47.06% in group V and 20.59% in group VI (30). D.Gangulappa et al. studied 50 cadavers' lower limbs and found the sciatic nerve division as a group I in 6%, group II in 4%, group IV in 6% and group V in 84% (31).

In our study, the sciatic nerve division corresponds to 28.75% in group I, 8.75% in group II, 6.25% in group III, 3.75% in group IV and 52.5% in group V. The most common type of division in our study is at the level of the popliteal fossa apex. This corresponds to studies done by Prakash et al., Sawant SP et al., and Mayan Kumar D Javia et al.

Variations in the level of division of the sciatic nerve may result in the involvement of one or both of its divisions in cases of injury. The symptoms may vary depending on the level of the sciatic nerve injury also whether a whole nerve or single division is involved. In cases of higher bifurcation of the sciatic nerve, the chances of involvement of one of the divisions are more than the whole nerve. Hence there is reduced severity of the symptoms. These variations in the sciatic nerve division may have clinical implications in nerve block anaesthesia, hip surgeries and clinical symptoms in nerve injury or entrapment cases. Variations in the sciatic nerve division may lead to failed anaesthetic procedures (Moore and Dalley, 1999). According to Vloka JD et al., the sciatic nerve bifurcates into terminal branches at a distance ranging from 0-115mm above the popliteal fossa (39). Therefore, the ideal site for the popliteal block is about 100mm above the popliteal crease.

Conclusion

Due to its long course, the sciatic nerve is more prone to injury either post-traumatic or iatrogenic. In addition, due to the variations in its relation to the piriformis muscle and its variable division level, it is also vulnerable in various clinical conditions. A thorough anatomical study of such variations will help minimize the complications from surgical procedures and better understand symptoms in nerve entrapments or nerve injuries and also a failure of nerve blocks. This study explains variations in the sciatic nerve anatomy in the South Indian population to create some awareness among clinicians.

Acknowledgements

Thanks to all my faculty, colleagues and staff who helped me in this study.

References

1. Saritha S, Praveen Kumar M, Supriya G. Anatomical variations in the bifurcation of the sciatic nerve, a cadaveric study and its clinical implications, *Anatomy and Physiology:Current research*, 2012;2(5):1-4.
2. K. L. Moore, A. F. Dalley, A. M. R. Agur. *Clinically Oriented Anatomy*, Wolters Kluwer, Philadelphia, PA, USA. 2018, 8th edition.

3. D'Antoni AV. Clinically Oriented Anatomy, 7th Edition, by Keith L. Moore, Arthur F Dalley II, and Anne MR Agur. Philadelphia: Lippincott Williams & Wilkins, 2014; 27(2):274.
4. Kanawati AJ. Variations of the sciatic nerve anatomy and blood supply in the gluteal region: A review of the literature. *Anz J Surg.* 2014; 84(11):816-19.
5. S. R. Mitra, S. Roy, A. S. Dutta, A. Ghosh, R. Roy, and A. K. Jha. Piriformis syndrome: a review. *Journal of Evolution of Medical and Dental Sciences*, 2014; Vol. 3(14):3804– 3814.
6. Gomes BA, Ramos MRF, Fiorelli RKA, Almeida CRD, Fiorelli SKA. Topographic anatomical study of the sciatic nerve relationship to the posterior portal in hip arthroscopy. *Revista do Colégio Brasileiro de Cirurgiões.* 2014; 41:440-44.
7. Standring S. Gray's Anatomy, 39th Edition: The Anatomical Basis of Clinical Practice. *AJNR* 2005; 26: 2703-2704
8. D. G. Kulcu and S. Naderi. Differential diagnosis of intra spinal and extra spinal non- discogenic sciatica. *Journal of Clinical Neuroscience*, 2008; 15(11):1246–1252.
9. L. E. Beaton and B. J. Anson. The relation of the sciatic nerve and of its subdivisions to the piriformis muscle. *The Anatomical Record*, 1937; 70(1):1–5.
10. Tomaszewski KA, Graves MJ, Henry BM, Popieluszko P, Roy J et al. Surgical anatomy of sciatic nerve: A meta analysis. *J Orthop Res.* 2016;34(10): 1820-27.
11. Cassidy L, Walters A, Bubb K, Shoja MM, Tubbs RS, Loukas M. Piriformis syndrome: Implications of anatomical variations, diagnostic techniques, and treatment options. *Surg Radiol Anat* 2012; 34(6):479-86.
12. Smoll NR. Variations of the piriformis and sciatic nerve with clinical consequence: a review. *Clin Anat*, 2010; 23: 8-17
13. Ameet Kumar Jha and Prakash Baral. Composite anatomical variations between the sciatic nerve and the piriformis muscle: A Nepalese cadaveric study. *Case reports in Neurological Medicine*, 2020; 4:1-6.
14. M. Adibatti. Study on variant anatomy of sciatic nerve, *Journal of Clinical and Diagnostic Research*, 2014;8:AC07–9.
15. M. Desalegn and A. Tesfay. Variations of sciatic nerve its exit in relation to piriformis muscle in the northern Ethiopia. *International Journal of Pharmaceutical Sciences and Research*, 2014; 5(12): 953–956.
16. R. Haladaj, M. Pingot, M. Polgaj, G. Wysiadeci, and M. Topol. Anthropometric study of the piriformis muscle and sciatic nerve: a morphological analysis in a polish population. *Medical Science Monitor: International Medical Case Reports in Neurological Medicine, Journal of Experimental and Clinical Research.* 2015; 21:3760– 3768.
17. B. A. Beriha and Y. G. Debeb. Anatomical variation in bifurcation & trifurcations of sciatic nerve & its clinical implications: in selected university in Ethiopia. *BMC Research Notes*, 2015; 8(1):633.
18. D. Pokorný, D. Jahoda, D. Veigl, V. Pinskerova, and A. Sosna. Topographic variations of the relationship of the sciatic nerve and the piriformis muscle and its relevance to palsy after total hip arthroplasty. *Surgical and Radiologic Anatomy.* 2006; 28(1):88–91.
19. Antoni D. Antoni, Charles A. Oyinbo, Daminola A. U. Francis, Ugochukwu L. Tabowei. Anatomical variation of sciatic nerve: A study on the prevalence, and bifurcation loci in relation to the piriformis and popliteal fossa. *Acta Medica Academica.* 2022; 51 (1).
20. M. B. Sinha, A. Aggarwal, D. Sahni, K. Harjeet, R. Gupta, H. P. Sinha. Morphological variations of sciatic nerve and piriformis muscle in gluteal region during fetal period. *European Journal of Anatomy.* 2014; 18(4):261–266.
21. O. Sulak, B. Sakalli, G. Ozguner, Y. Kastamoni. Anatomical relation between sciatic nerve and piriformis muscle and its bifurcation level during fetal period in human. *Surgical and Radiologic Anatom.* 2014; 36 (3): 265–272.
22. Konstantinos Natsis, Trifon Totlis, George A Konstantinidis, George Paraskevas, Maria Piagkou. Anatomical variations between the sciatic nerve and the piriformis muscle: a contribution to surgical anatomy in piriformis syndrome. *Surg Radiol Anat.* 2014; 36:273-280.
23. Kathe Dinesh Prakash, Bhusari Prasant Amanrao, Khairnar Karan, Shinde Santosh. Study of anatomical variations of the sciatic nerve and its importance to clinicians and anesthetist. *International journal of current research.* 2014; 6(7):7518-7521.
24. K. Natsis, T. Totlis, G. A. Konstantinidis, G. Paraskevas, M. Piagkou, J. Koebke. Anatomical variations between the sciatic nerve and the piriformis muscle: a contribution to surgical anatomy in piriformis syndrome. *Surgical and Radiologic Anatomy.* 2014; 36(3): 273–280.
25. Ugrenovic S, Jovanovic I, Krstic V, Stojanovic V, Vasovic L, Antic S, Pavlovic S: The level of the sciatic nerve division and its relations to the piriformis muscle. *Vojnosanit Pregl.* 2005; 62(1):45-49.
26. Babinski MA, Machado FA, Costa WS. A rare variation in the high division of the sciatic nerve surrounding the superior gemellus muscle. *European journal of Morphology.* 2003; 41(1):41-2.
27. Prakash, Bhardwaj AK, Devi MN, Sridevi NS, Rao PK, Singh G. Sciatic nerve division: A cadaver study in the Indian population and review of the literature. *Singapore Med J.* 2010; 51(9):721.
28. Azza I Farag, Rashma M Salama. Anatomical variants of the sciatic nerve division in the pelvis, the gluteal region and the thigh: A cadaveric study. *Journal of clinical and diagnostic research.* 2021; 15(12): 6-10.
29. Sawant SP. The study of division of sciatic nerve in 100 specimens with its clinical significance. *IJSR.* 2013; 2(2):306-09.
30. Mayank Kumar D Javia, Sanjay K Vikani. Cadaveric study on variations in the level of bifurcation of sciatic nerve and its clinical implications. *International Journal of Anatomy, Radiology and Surgery.* 2019; 8(2):29-32.
31. D.Gangulappa, K.Shashi Kantha. Anatomic variations of sciatic nerve bifurcation in Human cadavers. *International journal of Anatomy and Research.* 2018; 6(4.1): 5772-77.
32. Beaton LE, Anson BJ. The relation of the sciatic nerve and its subdivisions to the piriformis muscle. *Anat Rec.*1937; 70:01-05.
33. Gabrielli C, Olave E, Mandiola EI. Inferior gluteal nerve course associated to the high division of the sciatic nerve. *Rev Chil Anat.* 1997; 15(1):79-83.
34. Pokorný D, Jahoda D, Veigl D, Pinskerová V, Sosna A. Topographic variations of the relationship of the sciatic nerve and the piriformis muscle and its relevance to palsy after total hip arthroplasty. *Surg Radiol Anat.* 2006; 28:88-91.
35. Guvencer M, Iyem C, Akyer P, Tetik S, Naderi S. Variations in the high division of the sciatic nerve and relationship between the sciatic nerve and the piriformis. *Turk Neurosurg.* 2009; 19(2):139-44.
36. Ogeng'o JA, Busaidy HE, Mwika PM, Khanbhai MM. Variant anatomy of Sciatic nerve in a black Kenyan population. *Folia Morphol.* 2011; 70(3):175-79.
37. Patel S, Shah M, Vora R, Zalawadia A, Rathod SP. A variation in the high division of the sciatic nerve and its relation with piriformis muscle. *Nat J Med Res.* 2011; 1(2):27-30.
38. Dhivya S, Anbusudar K. A study of the bifurcation of sciatic nerve and its clinical importance. *Int J Anat Res.* 2016; 4(1):1828-32.
39. Vloka JD, Hadzic A, April E, Thys DM. The division of the sciatic nerve in the popliteal fossa: anatomical implications for popliteal nerve blockade. *Anaesth Analg.* 2001; 92:215-17.