

A LITERATURE REVIEW ON: PIRIFORMIS SYNDROME AND ITS CAUSES

Mariana Rossi Silva da Paixão

IMEPAC-Araguari MG

<http://lattes.cnpq.br/2092998881967145>

Lara de Sousa Santos

IMEPAC-Araguari MG

<http://lattes.cnpq.br/9204414042473291>

Isabella de Melo Ramos

IMEPAC-Araguari MG

<http://lattes.cnpq.br/8496317109769783>;

Gabriela Resende de Sousa

IMEPAC-Itumbiara GO

<http://lattes.cnpq.br/1758258820396248>

Pedro Paulo Pacheco de Sa

IMEPAC-Araguari MG

<http://lattes.cnpq.br/9174602665452421>

Maria Lara da Silva

União das Faculdades dos Grandes Lagos SP

<http://lattes.cnpq.br/4718819861544727>

Alexia Geovanna Lourenço Cruz

IMEPAC-Itumbiara GO

<http://lattes.cnpq.br/3042073449046776>

Gabriel Augusto Noah Galdino Pereira Rodrigues

IMEPAC-Itumbiara GO

<http://lattes.cnpq.br/3042073449046776>

Geovanna Souza Azevedo

IMEPAC-Itumbiara GO

<http://lattes.cnpq.br/9650546403662763>

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



Cely Cristiane Nery Silva Pirett
Universidade Federal de Uberlândia
<http://lattes.cnpq.br/8415702125548903>

Kellen Cristine Pereira
IMEPAC-Araguari MG
<http://lattes.cnpq.br/2533477906201843>

Nilson Santos dos Reis
IMEPAC-Araguari MG
<http://lattes.cnpq.br/3769024493298512>

Abstract: INTRODUCTION:The piriformis muscle, located on the posterior wall of the lesser pelvis, is an essential structure for the study of the pelvic region. It originates on the pelvic surface of the sacrum (second to fourth vertebrae), ilium, and sacrotuberous ligament. The anatomical relationships that the sciatic nerve maintains during its passage through the greater sciatic foramen make it susceptible to injuries and painful symptoms, through compression or pinching of the nerve by the piriformis muscle, which may originate from anatomical variations and pathophysiological conditions, characterizing the Syndrome of Piriformis (SP) which is a neuromuscular disorder, caused by compression or irritation of the sciatic nerve, in its relationship with the Piriformis muscle. The incidence of this piriformis syndrome is reported in the literature as prevalent in female patients. **GOAL:** The objective of the present review is to carry out a systematic and panoramic reading of the published works on Piriformis Syndrome. The aim of this work is to specifically assess which are the main etiological factors that cause the syndrome. **METHODOLOGY:** the methodology used consists of a literature review about the piriformis muscle syndrome, through a bibliographic research, emphasizing aspects related to age, sex and the determining factors of causes. : Piriformis Syndrome, Piriformis Muscle, Piriformis Muscle Syndrome diagnosis, Sciatica. When accessing the database, 53 articles were found, relating to the last five years (2013 to 2022). And, after careful reading, 2 books and 35 articles were selected, 19 of which refer to case reports and were used for data collection. **RESULTS AND DISCUSSION:** In view of the data, there is a predominance of PS in women, in 65% of cases. Regarding the causes, there is a codominance between anatomical variations and ergonomic injuries, totaling 52.16%. The

predominant age group is between 17 and 43 years old, in 56.52% of cases. **CONCLUSION:** Of the 19 articles used, 80% were published in the last 3 years, indicating an increase in cases and frequency of analysis. As for the causes of PS, there was a prevalence of anatomical variations and ergonomic problems (26.08% each).

Keywords: Piriformis Syndrome, Piriformis Muscle, Piriformis Muscle Syndrome diagnosis, Sciatica.

INTRODUCTION

The piriformis muscle, located on the posterior wall of the lesser pelvis, is an essential structure for the study of the pelvic region. It originates on the pelvic surface of the sacrum (second to fourth vertebrae), ilium, and sacrotuberous ligament. Through the greater sciatic foramen, the muscle leaves the pelvis and inserts on the superior surface of the greater trochanter of the femur. Due to its size, it is related to many structures (muscles, vessels and nerve branches) of the pelvic region and, therefore, it is the reference point for all important structures that pass between the pelvis and the gluteal region. (DOS SANTOS et al, 2019)

The sciatic nerve arises from the anterior and posterior divisions of the anterior rami of the L4-S3 spinal nerves of the sacral plexus. The branches that constitute the nerve converge on the inferior border of the piriformis muscle, emerging in the gluteal region through the greater sciatic foramen laterally. It bifurcates into the tibial and common fibular nerves and separates during the course of descent to the thigh. The tibial nerve runs below the piriformis muscle and the common peroneal nerve pierces the muscle or passes superior to it (MOORE AND DARLEY et al, 2005).

The anatomical relationships that the sciatic nerve maintains during its passage through the greater sciatic foramen make it susceptible

to injuries and painful symptoms, through compression or pinching of the nerve by the piriformis muscle, which may originate from anatomical variations and pathophysiological conditions, characterizing the Syndrome of Piriformis (GRECO et al, 2017).

In terms of topographic variations between the sciatic nerve and the piriformis muscle, there are reports of up to six variations, which can be subdivided into two large groups: A group in which the sciatic nerve forms and remains unchanged, in a single trunk, passing over or through the piriformis muscle. And in a group in which there is no formation of the sciatic nerve and the common fibular and tibial nerves are directly related to the piriformis muscle, still in the pelvic region, before its passage through the muscle or posterior to it (NATSIS et al, 2014).

Six anatomical relationships are possible between the sciatic nerve and piriformis muscle, according to the classification by Beaton and Anson (1938). The first, most common, is the normal relationship, in which the undivided nerve passes inferiorly to the muscle. The second, division of the nerve between and below undivided muscle. The third, division of the inferior nerve and superior to undivided muscle. The fourth, undivided nerve between muscle bellies. Fifth, division superior and between the bellies of the muscle. And the last one, undivided nerve passing superior to the undivided muscle (GOMES et al, 2014)

The anatomical variation in which the sciatic nerve divides into two branches in the pelvic region occurs during embryonic development. This separation may remain until adulthood or unify during gestational development. After dividing, the nerve can travel either inferiorly to the piriformis muscle, or the peroneal bundle can perforate the muscle belly, and the tibial branch can follow inferiorly. In the variant in which

the sciatic nerve divides before reaching the piriformis muscle, during the fetal period, coexists with the possibility that the nerve subsequently rejoins into a single bundle. (GRECO et al, 2017).

Piriformis syndrome is a neuromuscular disorder caused by compression or irritation of the sciatic nerve in its relationship with the Piriformis muscle. The incidence of this piriformis syndrome is reported in the literature as prevalent in female patients, according to (BRIEFREVIEW, JORNAL BRASILEIRO DE NEUROCIRURGIA) in a ratio of 6:1 and second. The clinical picture is characterized by pain in the gluteal region, radiating to the lumbar region, hips and lower limbs, which may be associated with paresthesia and paresis. The first report on the piriformis muscle as an etiologic factor of sciatica was recorded in 1928 by Yeoman. However, it was only in 1947 that the terminology Piriformis Syndrome was used for the first time, by Robinson (DOS SANTOS, 2019).

Although evidence indicates that piriformis syndrome is responsible for about 6% to 7% of cases (pyramidal syndrome) of pain related to the sciatic nerve, the literature is still scarce in published works on the subject. This syndrome can be associated with several other pathologies, such as lumbar hernias, arthrosis (lumbar or coxo-femoral), spondylolisthesis and with this, it makes its diagnosis even more difficult. For this reason, its diagnosis is usually obtained through the exclusion of other pathologies, through the performance of some tests (DAMASCENO and MALTA, 2022). Among these, the Lasegue tests stand out (clinical sign for the evaluation of pain in the posterior part of the leg, through flexion of the thigh, with the leg extended); Freiberg (pain with forced internal rotation with extended thigh); and Pace, which is the clinical assessment of pain when performing

abduction and rotation of the thigh against resistance (JANKOVIC, 2013).

The piriformis muscle has a primary function, in the neutral position, of external rotation of the hip and abduction of the hip, when it is flexed in an open kinetic chain, that is, when the hip is flexed above 90°. In a closed kinetic chain, it acts as an extensor and external rotator of the hip, when the hip is flexed to 90°. The diagnostic criteria are based on the functional analysis of the movements performed by the muscle, evaluating the presence of sciatic pain during testing. Definitive confirmation of the diagnosis is obtained by performing Axial Computed Tomography and Magnetic Resonance Imaging (SCHMITT et al. 2013).

GOALS

The objective of the present review is to carry out a systematic and panoramic reading of the published works on Piriformis Syndrome. The aim of this work is to specifically assess which are the main etiological factors that cause the syndrome. In addition, it strives to carry out an analysis of epidemiological data, collected from selected case studies, in order to establish relationships between age and sexual factors and the occurrence of the Syndrome.

METHODOLOGY

To achieve the aforementioned objectives, the methodology used consists of a literature review about the piriformis muscle syndrome, through a bibliographic research, highlighting aspects related to age, sex and the determining factors of causes. The systematization used is supported by books from its own collection, in addition to scientific articles in Portuguese, English, French and Spanish, consulted through the PubMed, BVSalud and Scielo websites. As a strategy to search for a bibliographic reference, the descriptors were used: Piriformis Syndrome, Piriformis Muscle,

Piriformis Muscle Syndrome diagnosis, Sciatic pain.

When accessing the database, 53 articles were found, relating to the last five years (2013 to 2022), with 20 articles and 1 book in PubMed, 19 articles and 1 book in the BVSaúde and 14 articles in the Scielo database. And, after careful reading, 2 books and 35 articles were selected, 19 of which refer to case reports and were used for data

collection. After careful selection of studies filtered by descriptors, duplicates were excluded, and then titles and abstracts were analyzed in order to exclude studies irrelevant to this review. Subsequently, case reports were quantified, analyzing the variables age, sex and causal factors, organized through tables, in order to simplify the visualization of the results.

RESULT AND DISCUSSION

Age of the people (in years)	Gender					
	Male		Female		Total	
	fi	%	fi	%	fi	%
04 – 17	2	100,00	0	0,00	2	100,00
17 – 30	3	50,00	3	50,00	6	100,00
30 – 43	2	28,57	5	71,43	7	100,00
43 – 56	0	0,00	2	100,00	2	100,00
56 – 69	1	33,33	2	66,67	3	100,00
Undetermined	0	0,00	3	100,00	3	100,00
Total	8	34,78	15	65,22	23	100,00

Etiology	fi	%
Anatomical variation	6	26,08
Ergonomic problems	6	26,08
Piriformis hypertrophy	4	17,39
Pyomyositis	3	13,05
Tumor	2	8,70
Ganglion cyst	2	8,70
Total	23	100,00

Source: Authors themselves

The incidence of this syndrome in the population is only 6%, being more common in females than in males (POLESELLO et al, 2013), it is more frequent in the third and fourth decade of life, the semiology most found in piriformis syndrome is pain in the buttock region accompanied by sciatica increased by the sitting position, by palpation of the great sciatic foramen and by maneuvers that increase the tension of the piriformis muscle (OLIVEIRA and CARMEZIM, 2019). In view of the data, there is a predominance of PS in women, in 65% of cases. Regarding the causes, there is a codominance between anatomical variations and ergonomic injuries, totaling 52.16%. The predominant age group is between 17 and 43 years old, in 56.52% of cases. The greatest relationship in women is due to biomechanics related to the angle of the quadriceps femoris muscle in the female pelvis. In addition, men tend to sit in a more open-legged position, so their piriformis muscle serves as the external rotator of the hip and shortens, whereas in females the opposite is true in the case of women, they sit with the leg crosswise, a position in which the piriformis muscle is in excessive stretching, since the hip is flexed and externally rotated (DOS SANTOS.)

Most ergonomic injuries are due to the sitting position injuring the sciatic nerve. He suffers a compression of the piriformis muscle, this fact causes pain, thus producing the piriformis syndrome, so it is common for this syndrome to appear in people who work most of the day sitting, such as bus drivers, truck drivers and even tractor drivers. or ubers. Sitting for much of the day, even in activities considered light, can lead to fatigue, circulatory disorders, degeneration of intervertebral discs and pain (SWERTS, 2013).

CONCLUSION

Of the 19 articles used, 80% were published in the last 3 years, indicating an increase in cases and frequency of analysis. As for the causes of PS, there was a prevalence of anatomical variations and ergonomic problems (26.08% each). In addition, it is noted that PS mainly affects the economically active population and may be related to the occupation performed, requiring a test to identify piphymal lesions, such as passive abduction and medial (internal) rotation of the hip, in which the result is interpreted as positive when the examinee reports pain in the gluteal region (SWERTS, 2013). In addition, on the treatment of SP there are several measures, including: Physiotherapy, acupuncture, injections of anesthetic solutions in the piriformis muscle, remembering that you must be extremely careful, due to its small size, proximity to neurovascular structures and deep location, in addition, botulinum toxin can be given up, but there is still little evidence reported in their studies and little knowledge, this effect is to promote the relief of pain in the muscle and finally the treatment by piriformis tenotomy, being used as a last resort, as it is a highly invasive maneuver. Approaching the treatment can be done. that form the exercise of certain professions contribute to the development of the Syndrome for the development of effective forms of prevention, diagnosis and treatment for the patients.

REFERENCES

- DAMASCENO, Adriana Marília Guerra Barreto; MALTA, Márcio. A CINESIOTERAPIA NA SÍNDROME DO PIRIFORME. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, v. 8, n. 5, p. 270-281, 2022.
- DOS SANTOS, Leticia Adrielle; OLIVEIRA, Carlos Eduardo Freire; PEREIRA, Carlos Umberto. Síndrome do Piriforme: estado da arte. *JBNC-JORNAL BRASILEIRO DE NEUROCIRURGIA*, v. 29, n. 4, p. 650-666, 2019.
- KIRSCHNER, Jonathan S.; FOYE, Patrick M.; COLE, Jeffrey L. Piriformis syndrome, diagnosis and treatment. *Muscle & nerve*, v. 40, n. 1, p. 10-18, 2009.
- GOMES, Berliet Assad *et al.* Estudo anatômico topográfico da relação do nervo ciático com o portal posterior nas artroscopias de quadril. *Revista do Colégio Brasileiro de Cirurgiões*, v. 41, p. 440-444, 2014.
- GRECO, Fernanda Palmas Fernandes *et al.* Variações anatômicas do nervo isquiático associadas ao músculo piriforme em fetos e crianças de até 1 ano de vida pós-natal. *Mundo saúde (Impr.)*, v. 41, n. 4, p. [581-587], 2017.
- OLIVEIRA, Rui Jorge; CARMEZIM, Ilídia. Síndrome piriforme: uma causa de dor ciática. *Rev Port Med Geral Fam*, v. 35, p. 313-7, 2019.
- POLESELLO, Giancarlo Cavalli *et al.* Variação anatômica do músculo piriforme como causa de dor glútea profunda: diagnóstico por neurografia RM e seu tratamento. *Revista Brasileira de Ortopedia*, v. 48, n. 1, p. 114-117, 2013.
- FAGUNDES, Luciany Everardo Atencio Santamaría. Variações anatômicas entre o nervo isquiático e o músculo piriforme e sua relação com a síndrome do piriforme. *Fisioterapia Brasil*, v. 7, n. 2, p. 90-94, 2018.
- JANKOVIC, Danilo; PENG, Philip; VAN ZUNDERT, André. Brief review: piriformis syndrome: etiology, diagnosis, and management. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*, v. 60, n. 10, p. 1003-1012, 2013.
- NATSIS, Konstantinos *et al.* Anatomical variations between the sciatic nerve and the piriformis muscle: a contribution to surgical anatomy in piriformis syndrome. *Surgical and Radiologic Anatomy*, v. 36, n. 3, p. 273-280, 2014.
- POLESELLO, Giancarlo Cavalli *et al.* Variação anatômica do músculo piriforme como causa de dor glútea profunda: diagnóstico por neurografia RM e seu tratamento. *Revista Brasileira de Ortopedia*, v. 48, n. 1, p. 114-117, 2013.
- SCHMITT, CRISTIANE *et al.* A fisioterapia na síndrome do músculo piriforme: uma revisão da literatura. *Uningá Review*, v. 16, n. 1, 2013.
- SWERTS, Olavo Souza Dias. **Avaliação de distúrbios osteomusculares entre condutores de veículos de transporte de cargas.** 2013. Tese de Doutorado. Universidade de São Paulo.