



# Anatomy of the sciatic nerve and its clinical significance in the light of Greeko-Arab physician's research

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**Abstract:** *Irq al-Nasā* (sciatic nerve) is the largest, strongest and thickest nerve in the body that comes out of the spine and passes through the hips to the toes. The word sciatica has been used since Greek times, for ischias or pain arising from or around the hip and thigh. Iranian traditional medicine (ITM) books refer to *Irq al-Nasā* (sciatica) as "Ergho Nasaa" that means the pain in "Nasaa" (Noosa, according to Galen) vein route in the lower limb. "Nasaa" refers to a vein, so "Ergho Nasaa" points to the disorder in the route of this vein, but nowadays "sciatic" is the name of a specific nerve, not a vein and sciatica refers to pain that occurs sciatic nerve problems.

**Keywords:** *Irq al-Nasā*, Sciatica, Sacral plexus, Raigan bao, Nervine pain.

**Introduction:** The word *Irq al-Nasā* (sciatica) has been used since Greek times, for ischias or pain arising from or around the hip and thigh. Before modern ideas of pathology, the term did not mean pain in the distribution of the sciatic nerve.<sup>1</sup> Various Unani scholars define *Irq al-Nasā* (sciatica) as an Arabic term referring to the name of a nerve affecting the *maqām Ilwiyya* (gluteal region) and *al-Ka'b* (ankle), and they have explained its pathophysiology, management of symptoms, and treatment in ancient books.<sup>2</sup> A book on medical ethics, Iranian Traditional Medicine (ITM) books In this book, sciatica is a chronic and poor prognosis disease, which agitates the physicians.<sup>3</sup> in ITM books referred this problem as "Ergho Nasaa" that means the pain in "Nasaa" (Noosa, according to Galen) vein route in the lower limb. "Ergho Nasaa" converted to sciatic and the pain is related to hip. However, "Nasaa" refers to a vein, so "Ergho Nasaa" points to the disorder in the route of this vein, but nowadays "sciatic" is the name of a specific nerve. not a vein and sciatalgia refers to pain due to sciatic nerve problems. Despite the misnomer, description of sciatalgia and "Ergho Nasaa" are almost the same.<sup>3</sup>

Pain in sciatic nerve distribution was known and recorded by ancient Greek and Roman physicians but was commonly attributed to diseases of the *Mafsil al-Warik* (hip joint).<sup>4</sup> **Hippocrates (460-377 BC)** was the first physician to use the term 'sciatica' although probably mainly to implicate disease of the hip<sup>5</sup> and noted that "ischiatric" pain mainly found in older aged 40-60 years and that in younger men it usually lasted 40 days. Radiation of pain to the foot was regarded as a good prognostic sign but if it stayed in the hip it was dreaded.<sup>1</sup>

*Irq al-Nasā* (sciatic nerve) is the largest, strongest and thickest nerve in the body that comes out of the spine and passes through the hips to the toes.<sup>6,7,8,9</sup> and the ventral roots (anterior rami) of spinal nerves L4–L5 and S1–S4 form *zafira Ajuz* (sacral plexus). This plexus is situated largely anterior to the sacrum<sup>9</sup> and goes out of the path of *Thulma Warikiyya Azima* (greater sciatica notch) under the *adala makhrootiya* (pyriformis) and out from pelvis and enters *khit al wiyya* (gluteal line). This beginning runs between *Hadaba Warikiyya* (ischial tuberosity) and lower limb and crosses the *Adala Sadda Batina* (obturator internus), *Adala Taw'amiyya Saqiyya* (gastrocnemius), *Adala Murabba'a Fakhidhiyya* (quadratus femoris), and *Adala Muqarriba 'Azima* (adductor magnus). Usually, the upper two-thirds and the lower one-third of the thigh are divided into two large branches. The outer branch is known as lateral popliteal nerve and the inner branch is called medial popliteal nerve.<sup>10</sup>

Sciatica is a pain in the lower back and hip region, which radiates inferiorly along the posterior thigh to the leg along the course of the sciatic nerve.<sup>9, 11</sup> Injury to the sciatic nerve and its branches results in sciatica, pain that may extend from the buttock down the posterior and lateral aspect of the leg and the lateral aspect of the foot. Herniated (slipped) disc, dislocated hip, osteoarthritis of the lumbosacral spine, compression from the uterus during pregnancy, inflammation, irritation, or an improperly administered gluteal intramuscular injection may lead injury to the sciatic nerve.<sup>19</sup> The piriformis muscle compresses the sciatic nerve and results in inflammation called piriformis syndrome, which may result from a variant or anomalous relationship between piriformis and the sciatic nerve.<sup>11</sup> Sciatica has two major types of causes, Primary causes include gout, rheumatism, syphilis, neuromata, poisons, trauma or cold. Secondary causes included pelvic tumours, a distended rectum and bone disease, especially hip joint disease.<sup>1</sup>

**Aim & Objectives:** To make a clear concept about the course of sciatic nerve and its clinical implications. To Collect the Concepts of *Irq al-Nasā* (sciatica) who contributed the Unani physicians, To know who were the pioneers and discoverers of anatomical description of *Irq al-Nasā* (sciatica).

**Material & method:** In this paper, we have searched and collected the material from Unani Classical books viz. Al-Qanun fil-Tib, Kamil-us-Sanaa, kitab al-Mansoori, Kitab al- Umda fil Jarahat, Kulliyat-e-Nafisi. In addition to the modern concept we went through Modern books, Journals and Research Papers in the databases Pubmed, Embase, TRIP, CINAHL, Amed, and other resources.

### Review literature

There are five pairs of lumbar nerves released from the lumbar vertebrae.<sup>12,13,14,15,16,17</sup> Generally, its branches on the back side reach all the muscles of the back and in the front side nourish the abdominal muscles and gluteus muscles, however, two large nerves come out from the middle of the last two vertebrae, that reach the leg, this large pair also gets a pair of small nerves, in which one nerve comes out of the third lumbar vertebra and the second comes out from the first foramen of the sacrum, then it spreads to the first muscle of the hip joint and descends and reaches the feet, nourishing the muscles of the calf. Four pairs of nerves emerge from sacrum, the first of which goes to the leg with lumbar nerves, the remaining three pairs spread to the muscles of the anus, penis and bladder, and the places close to these organs.<sup>12,13</sup> The lumbar nerves are common in the sense that a part of them goes into the muscles of the spine and the other part into the muscles of the abdomen and the muscles lining the spine. However, three upper lumbar nerves join the nerve coming from the brain, while others do not. A long branch proceeds towards the lower two pairs going to the two shanks where a branch of the third pair and the first nerve of the sacrum meet. These two branches do not go farther than the hip joints but spread out in their muscles which extend to the shanks. The other nerves proceed beyond the hip joint and end up in the shanks.<sup>13, 14, 15, 16</sup>

There is a difference between the nerves of the thigh and the legs and those of the arms; the nerves innervating the thigh are relatively deeper as the thigh joins the hip bone like the arm joining the scapula. Further, the thigh is not connected with the source of its nerves in the same way as the arm is connected with its source of nerves. The nerves of the shank proceed differently, some going on the inner side, some on the outer and some penetrating deeply under the muscles. Since the nerves which arise in the region of the pubic bone cannot enter the legs either from the back of the body or through the inner parts of the thigh because of the abundance of the muscles and blood vessels, a part of the main nerve was to pass through the muscle of the leg. Thus it can follow the channels going towards the testicles and enter the pubis from where they descend and reach the muscle of the knee.<sup>13, 14</sup>

According to *Buqrāt* (Hippocrates), if cold and severe numbness is felt in the spine and legs and its *Mizāj* (temperament) also has a *Balgham* (phlegm), then it is a sign that this disease will remain chronic disease.<sup>6</sup>

**Tabari (770-850 AD)** was the first one who believed that sciatica is a pain in the nerve that descends from hip to digits due to unfavourable humors mixed in blood.<sup>3</sup>

**Rhazes (850-925 AD)**, the author of Al-Hawi (Liber Continens), stated a detailed description of sciatica in his book. He cited the former physicians' ideas like Ibn Masouyeh (857 AD) besides his ideas and practices about this disease.<sup>3</sup> **Shaykh al-Rais (980-1037AD)** has written that the substance of sciatica is often present in the joint, later on it is formed in the nerves of the thighs. The

causes of sciatica and hip pain are also the same and the treatment of both of them is almost the same, but since the substance of these pains is more inside than the arthritis.<sup>18</sup>

**Shaykh al-Rais (980-1037):** In the treatment of *Irq al-Nasā Damawī* (bloody sciatica), opening the *Faşd* (venesection) is the most useless strategy, which is immediately beneficial, but first open the vein of the hand and then open the feet of the foot. Do not open the feet before the hand.<sup>19</sup>

**Hakim Azam Khan (1813-1902 AD)** mentioned "Ergho Nasaa" as sciatic nerve disorder, not Nasaa vein, due to substances and humour.<sup>3</sup> The twenty spinal nerve pair is also the first pair to be released from the lumbar vertebra, it is released from between the nineteenth and twentieth vertebrae, as well as 5 more spinal nerve pairs also come out of here, some of them spread in the front and spread in the abdominal muscles and some of them spread back muscles, they meet three upper pairs, then One nerve descends from the brain, and the remaining two pairs, which are located below these three joints, divide into large branches and reach the leg and feet.

Twenty-fifth pair: This is the first nerve that comes out of the first bone of the sacrum, then the second nerve from the second vertebra and the third nerve from the third vertebra, these nerves join the nerve released from the lumbar vertebra, and from there they come to the feet.<sup>20</sup>

### Clinical manifestation

It is a nerve pain that occurs in the path of the sciatic nerve. It is characterized by moderate to severe pain, starting from hip joint, mainly travelling laterally to ankle joint and rarely radiating from the medial side of thigh. There may be bending of leg when the pain persists for a longer duration or causative matter is in large quantity.<sup>21</sup> It is caused mostly by *Inşibāb-i-Akhlāṭ* (Pouring) four humours. The theory of four humours given by Buqrat states that the human body is filled with basic substances (four humours, vapor, and watery fluid). The four humours are *Dam* (sanguine), *Balgham* (phlegm), *Şafrā* (yellow bile /bilious) and *Sawdā* (black bile). Most diseases and disabilities supposedly result from an excess or abnormal type of one of these four humours.<sup>3, 21, 22</sup> The *Fāsīd Mādda* (morbid material) descends towards the foot because the feet are at the bottom. When these wastes become concentrated and not finding a way out, then the legs become diseased and If this waste accumulated in the body, will lead to disease in other organs.<sup>6</sup>

It is caused by *Şafrā* (yellow bile /bilious) disorders or being too much in the sun. This makes the fluid of the hips dry. When *Khilṭ Radī* (harmful humour) extracts are mixed with blood, they cause pain in the thigh.<sup>6, 10</sup> The same substance then goes into the fingers. So it gets *Niqris* (gout).<sup>6, 22</sup> The causes of this disease and the causes of the arthralgia are almost the same, but most of the phlegm substance goes into this vein and causes pain. Sometimes there is an abundance of *Rīḥ*.<sup>23</sup>, arthritis, gout, sitting or sleeping in a cold place, severe constipation and rectal diseases, etc.<sup>24</sup>

**Discussion:** It is the pain behind the hip, and from there, it reaches the knee, often it is also felt up to the ankle. The older the pain, the more its morbid substance descends; sometimes it reaches the toes, due to which it becomes difficult to keep the foot straight, all of which are according to the abundance of matter. Sometimes the joint of the shin is dislocated, if this morbid substance is removed, then all types of joint pain come to an end. The morbid substance of the sciatica is removed very quickly because it is in the joint, and then the matter is transferred to the *Adala 'Arida* (hamstring muscles), sometimes the first occurs in the *Adala 'Arida* (hamstring muscles).<sup>25</sup>

**Conclusion:** This paper will provide the work and literature of *Irq al-Nasā* (sciatica) given by Unani physicians, which can open many doors for review as well as futuristic clinical research on *Irq al-Nasā* (sciatica). It will also be fruitful to the teachers, researchers and clinicians who need to conduct anatomical research for better illustrations and information about sciatica. At the beginning of the eighth century, the intellectual center of the world shifted eastward and flourished until the beginning of the 13th century. Avicenna, Albucasis, and Rhazes, played an important role in imparting their knowledge in this period that had been recorded throughout history. Our present understanding of anatomy has accumulated over centuries, and progressive generations of physicians have contributed to the ever-growing evidence-based knowledge. This article explores the contributions made by Greeco-Arab physicians.

**Prospects:** The knowledge that we have collected was established in Greeco- Arab period when no technologies present by the medical celebrities and their gorgeous mind of that time. So, the present time scholar shouldn't be dependent on technology they

must also use their intelligence power which may be improved. These enlightened scholars advanced anatomical knowledge and, perhaps more importantly, the scientific method, directly impacting the mindset and methodologies of future anatomists.

**Conflict of Interest:** The authors confirm that this article's content has no conflict of interest.

## REFERENCES

1. Allan, D.B. and Waddell, G., 1989. An historical perspective on low back pain and disability. *Acta Orthopaedica Scandinavica*, 60(sup234), pp.1-23.
2. Qarshi MH. 2011, *Jameul Hikmat*, Idarae kitabush-hifa, New Delhi, pp. 1028.
3. Hashemi, M. and Halabchi, F., 2016. Changing Concept of Sciatica: A Historical Overview. *Iranian Red Crescent Medical Journal*, 18(2).
4. Pearce, J.M.S., 2007. A brief history of sciatica. *Spinal cord*, 45(9), pp.592-596.
5. Sweetman, B.J., 2011. The search for the meaning of a symptom: a historical view of Sciatica. *International Musculoskeletal Medicine*, 33(1), pp.30-33.
6. Tabri AH. 2010, *Firdaus al-Hikmat*, trans. Awwal Shah HM, Idara Kitab al-Shifa, Darya Ganj, New Delhi, pp. 293.
7. Arzani A, 2001, *Mezan i-Tib*, Faisal publication Jama Masjid Deoband, pp. 224
8. Imam G, 2001, *Ilaj al-Gurba*, trans. Ali MA, Idara Kitab al-Shifa, Darya Ganj, New Delhi, pp. 54.
9. Gerard J. Tortora, 2017, *Principles of Anatomy and Physiology*, 15th ed Printed at Shree Maitrey Pvt. Ltd, Noida, pp. 478.
10. Hamdani SKH, 1993, *Tashreeh ul-Ahsha*, 2<sup>nd</sup> ed., Taraqqi Urdu Bureau New Delhi, pp. 102.
11. Standring S, 2016, *Gray's Anatomy: The Anatomical Basis of Clinical Practice*, 41st edn, Elsevier Philadelphia USA, pp. 1321.
12. Majūsi A, 2010 *Kamil-us-Sanaa*, Trans. Kantoori GH, CCRUM New Delhi, pp. 159.
13. Masihi AS, 2008, *Kitab al-Miat*, Vol. 1, CCRUM, New Delhi, pp. 63.
14. Sina.I, 1993, *Al-Qanun fi al-Tibb*, Book-I, trans. Jamia Hamdard, New Delhi, pp. 95.
15. Hubal Baghdadi AA, 2005, *Kitab ul Mukhtart fi Tib*, vol.1, trans. CCRUM, Ministry of Health and Family Welfare, govt. of India, New Delhi, pp 47.
16. Masihi IQ, 1986, *Kitab Al- Umda Fil Jarahat*, vol. 1,trans. CCRUM, Ministry of Health and Family Welfare, govt. of India, New Delhi, pp. 60.
17. Arzani A, 2010 *Aksir al-Quloob* trans. CCRUM, Ministry of Health and Family Welfare, govt. of India, New Delhi, pp. 122.
18. Khan MA, 2011, *Aksee-re-Azam*, tran. HM Kabeeruddin, Idara Kitab al-Shifa, Darya Ganj, New Delhi, pp. 847.
19. Ahmad J, 2008, *Tazkira-i-Jaleel*, CCRUM, Ministry of Health and Family Welfare, govt. of India, New Delhi pp. 367.
20. Razi ABMZ, *Kitab al-Mansuri*, 1st Edition, trans. CCRUM, Ministry of Health and Family Welfare, govt. of India, New Delhi, pp 32.
21. CCRUM, 2014, *Standard Unani Treatment Guidelines for Common Diseases*, vol.-I, Ministry of Health and Family Welfare, govt. of India, New Delhi, pp. 160-161.
22. Ahmad Q, 1932 *Qanooncha* Nami Press Lucknow U.P. India, pp. 129.
23. Khan MA, 1983, *Haziq*, Mdeena Publishing Company, Karachi, pp. 376-77.
24. Multani HHC, *Taj ul-Hikmat*, CCRUM, New Delhi, pp. 46.
25. Chandpoori K, 1998, *Moojiz al-Qanoon*, CCRUM, New Delhi, pp. 404.