

Prognostic of Conservative Treatment in Lumbar Radiculopathy

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ABSTRACT

Low back pain is a common condition, which affects millions of people around the world. While there are several treatment options available, conservative treatment has been widely used as an initial approach to managing these conditions. The objective of this article was to highlight the potential of conservative approaches in the treatment and prognosis of low back pain. The search on the Pubmed platform was performed using the following search terms: "lumbar radiculopathy", "low back pain AND Sciatic pain", "conservative treatment". Articles published between 2014 and 2024 in English and Portuguese were included. The inclusion criteria were: experimental studies that evaluated the relationship between these materials and health and the environment. On the Google Scholar platform, the same search descriptors were used as on previous platforms. After searching the two platforms, 17 articles that met the inclusion criteria were selected. A key approach in conservative treatment is patient education by providing information about the nature of the condition, pain management strategies, and the importance of maintaining physical activity. Physical activity plays a crucial role in conservative treatment. Therapeutic exercise programs, such as muscle strengthening, stretching, and low-impact aerobic exercise, have been widely recommended. These exercises aim to strengthen the core muscles, improve flexibility and stability of the spine, thereby reducing pain and improving physical function. In addition, within the physical therapy approach, manual therapies have demonstrated significant benefits in relieving pain and improving function in patients with low back pain. Other conservative approaches to Physical Therapy may include techniques such as ultrasound, electrotherapy, and spinal traction. These modalities aim to relieve pain, improve the functions of the affected tissues, as well as restore psychophysiological condition in multimodal treatment approaches. Conservative approaches have been largely supported by scientific evidence. Randomized controlled trials have consistently demonstrated the efficacy of conservative treatment, including therapeutic exercises and manual therapies, in relieving pain and improving function in patients with low back pain and low back pain.

Key Words: Pain; Conservative treatment; Physical activity.

Date of Submission: 05-07-2025

Date of Acceptance: 16-07-2025

I. Introduction

Low back pain is a common health condition that significantly affects the quality of life of millions of people around the world. Low back pain involves low back pain associated with symptoms radiating to the gluteal region and lower limbs, due to compression or irritation of the lumbar nerve root. Both conditions can be debilitating, resulting in functional limitations, disability, and negative impact on daily activities.¹

Although there is a wide range of treatment options available for lumbosciatic pain, conservative treatment has been widely recommended as the first line of approach. Conservative treatment aims to relieve pain, improve function, and promote recovery without the need for surgical intervention. Understanding the efficacy of conservative treatment is essential to guide clinical decision-making and improve patient outcomes.²

In this article, we review the main aspects related to the conservative treatment of lumbosciatica. We explore the different modalities of conservative treatment, including patient education, therapeutic exercises, manual therapy, and the use of medications. Furthermore, we highlight the available evidence regarding the effectiveness of these approaches in pain relief, functional improvement, and optimization of short- and long-term outcomes. We consider aspects such as patient selection criteria and the challenges involved in choosing the appropriate treatment. Finally, we emphasize the ongoing need for research in this area to enhance the understanding of underlying mechanisms, improve treatment approaches, and provide more robust evidence regarding the effectiveness of conservative treatment.

Through this review, we hope to provide valuable information to healthcare professionals involved in the care of patients with lumbosciatica, assisting in informed decision-making and the provision of high-quality care.

II. Methodology

To conduct a narrative literature review on Lumbosciatica, the research sources utilized were the Pubmed and Google Scholar platforms. The search on the Pubmed platform was conducted using the following search terms: "lumbar radiculopathy," "low back pain AND Sciatic pain", " low back pain AND conservative treatment." Articles published between 2014 and 2024 in English and Portuguese were included. The inclusion criteria were: experimental studies that assessed the relationship between these materials and health and the environment.

On the Google Scholar platform, the same search descriptors were used as in the previous platforms. After searching on both platforms, 17 articles that met the inclusion criteria were selected. Subsequently, the reading and selection of relevant articles for the narrative literature review were conducted, which were used for the preparation of the work. The selected articles were analyzed for methodological quality and relevance to the subject in question.

III. Discussion

The spine is the central support of the body in an upright position, consisting of a bony structure made up of vertebrae, muscles, ligaments, discs, capsules, and tendons, whose purpose is to provide mobility to the spine. The spine is composed of 33 vertebrae, including 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal. It has physiological curvatures, such as cervical lordosis, thoracic kyphosis, lumbar lordosis, and sacral kyphosis. Furthermore, the spine has three planes of movement, including flexion and extension, lateral flexions, and rotations.

Within the spinal column, intervertebral discs are found, which are fibrocartilaginous structures responsible for cushioning the impact on the spine. These discs are composed of a fibrous ring made of fibrous cartilage and a gelatinous nucleus located at the center of the disc.⁵ Lumbosciatica is characterized by pain that radiates along the path of the sciatic nerve in the lower limbs, causing sensory alterations such as paresthesia. This condition can hinder daily activities and reduce the individual's quality of life.⁶ The main causes of lumbosciatica are disc protrusion, responsible for 90% of cases, herniated disc, spinal canal stenosis, post-laminectomy syndrome, and piriformis syndrome. When a case of lumbosciatica is observed, the primary objective is to relieve pain, and electrotherapy and segmental stabilization assist in restoring the patient's function.⁷

Segmental instability may occur due to the decreased capacity of the spinal stabilizers to maintain good control and the neutral zone within physiological limits. This can result in muscle weakness, disc degeneration, and/or injuries due to inadequate resistance.⁸ The lumbar region of the spine consists of five vertebrae located below the twelve thoracic vertebrae. These lumbar vertebrae are the largest and most robust in the spine, as they support the body weight in the lower region. The lumbar curvature is one of the physiological curvatures responsible for body support and is particularly susceptible to pain due to the mechanical disadvantage it faces. It is in this region that the highest incidence of spinal pain occurs.^{1,6}

The lumbar vertebral bodies are separated by elastic intervertebral discs composed of an annulus fibrosus and a nucleus pulposus. The range of motion between the vertebrae is partially determined by the resistance of the disc to distortion, as well as the angle and size of the articular surfaces between the processes. Vertebral mobility is greater when the discs are thicker and the articular surfaces are larger. These conditions are more prevalent in the lower lumbar region (L4, L5, and S1), where mobility between L5 and S1 is greater than between L1 and L2. However, the greater the range of motion, the higher the likelihood of collapse, making herniated discs and osteoarthritis more common in the distal part of the lumbar spine than in the proximal part.²

The lumbar discs are thicker at the front, contributing to the lordotic curvature of the area. Additionally, the ligaments play an important role in maintaining the configuration of the motor unit, minimizing the force required for coordinated movements, and restricting movement within their limits. Movements of the lumbar spine include flexion, extension, lateral bending, and rotation.⁹

The main ligaments of the lumbar spine are the same ones found in the lower portion of the cervical and thoracic spine (excluding the ribs). These ligaments include the anterior and posterior longitudinal ligaments, the yellow ligament, the supraspinous and interspinous ligaments, and the intertransverse ligaments. Additionally, there is an important and unique ligament of the lumbar spine and pelvis, known as the iliolumbar ligament.¹⁰

In the posterior part of the functional unit of the spine, we find the erector spinae muscles, located on either side of the spine. These strong and short muscles connect from one transverse process to the transverse process immediately below, running along the entire length of the lumbar spine. The anterior abdominal muscles play a crucial role in maintaining the normal lordotic curvature of the lumbar region.^{11,12}

Weakening of these muscles can lead to accentuation of lordosis and postural changes, resulting in pain in the lower back. Like other muscles in the body, the erector spinae muscles can become sensitive when irritated, fatigued, or traumatized. They play an important role in generating pain in the functional unit, causing pain in the lumbar region.⁶

Lower back pain affects about 80% of the world population at some point in their lives. Factors such as genetic characteristics, lifestyle, dietary habits, health care, stress, and posture can influence the incidence of low back pain, which can vary from acute to chronic pain. Acupuncture is a technique that can be used to reduce pain associated with low back pain. In this study, a bibliographic survey of scientific articles was conducted with the objective of analyzing a case study of a patient who presented intense lower back pain. The results showed that acupuncture was able to significantly improve the patient's quality of life, as after 10 sessions of 30 minutes, the patient reported no pain.^{13,14}

According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensory and emotional experience caused by tissue injury. The assessment of pain is carried out systematically at regular intervals to provide precise treatment.¹⁰

For analgesic therapy to be effective, it is important to adopt a plural approach, combining two or more agents or techniques of central or peripheral analgesia. These approaches can be pharmacological or non-pharmacological, and the synergy between them can reduce the need for medications and, consequently, the associated side effects.⁵

Low back pain is described by patients as a moderate to intense sensation that affects the lower back region. It affects approximately 80% of the global population, being more common in individuals of economically active age. The literature also indicates that this type of pain is associated with age, sex, low physical activity, smoking, and repetitive movements, impacting the daily lives of those affected.⁷

Chronic lower back pain (CLBP) is a condition that falls into the category of mixed pain caused by central sensitization and lasts for more than 12 weeks. It is the most common cause of disability in people under 50 years old. The return to work for these individuals is low and almost nonexistent after 24 months. It affects more than half of the global population. Panjabi's stabilization system theory is confirmed by the motor control disturbances of the lumbosacral spine stabilizers.^{11,12}

Studies have shown that activating the muscles of the lumbar spine, including the thoracic spine, is important for reducing pain. Motor control disorders are related to central regulatory mechanisms. Targeted exercises to strengthen these muscles help restore proper cortical representation and normalize the activation sequence, leading to decreased pain and disability in individuals with CLBP.^{5,7}

Lumbar stabilization exercises are used in the treatment of patients with segmental instability and low back pain, with an emphasis on activating the muscles of the thoracic spine to achieve full functional recovery.

Excessive movement of the lumbar spine is caused by reduced movement of the thoracic segments, leading to instability and pain in the lower back. Thoracic mobilization can help stabilize the lumbar spine, reducing pain intensity. The "cat-camel" exercise is the basis of lumbar stabilization and closed-kinetic chain thoracic mobilization exercises. Studies have demonstrated the effectiveness of this exercise in reducing low back pain.¹⁵

It is important to emphasize the importance of stabilization exercises and maintaining a neutral position during daily activities to avoid additional pressure on spinal structures. Closed kinetic chain exercise programs have advantages in rehabilitation, as they mimic functional movements of daily life and involve the contraction of multiple muscle groups.

Lumbar disc herniations typically affect the L4-5 or L5-S1 levels. Despite the favorable trend for low back pain due to disc herniation, lumbar discectomy remains a common procedure, with a large number of cases performed annually in the United States. Lumbar disc surgery is usually performed electively after at least six weeks of non-surgical treatment if leg pain persists and there is no cauda equina syndrome or progressive neurological deficit. Studies show surgical success rates between 92% and 98%. In the short term, patients who undergo surgery experience better functional outcomes and pain reduction, but after a two- to four-year follow-up, the statistical difference disappears, and surgical and non-surgical results become equivalent.^{10,15}

Furthermore, some studies report higher failure rates after surgery, including the need for reoperation and recurrence of sciatica. These unsatisfactory results can be caused by several factors, such as incorrect selection of the surgical level, inadequate decompression, unidentified segmental instability, retained disc fragment, extraforaminal nerve compression, and polyneuropathy. This article will review the common causes of recurrent leg pain after lumbar disc surgery, as well as the currently available treatment options.⁵

Initial studies revealed histological changes in spinal nerve roots after surgery to treat sciatica caused by lumbar disc herniation. These changes included perineural hyperplasia and an inflammatory reaction in nerve roots biopsied during surgery. These studies suggested that radicular pain associated with disc herniation is caused not only by mechanical compression of the nerve root, but also by biochemical irritation of the nucleus pulposus, resulting in an alteration in the normal physiology of the nerve root.^{1,2}

Additional research has shown that direct compression of the nerve root by herniated disc material and biochemical irritation of the nucleus pulposus are the two mechanisms underlying low back pain or sciatica due to lumbar disc herniation. Animal studies have demonstrated decreased nerve conduction velocity and histological evidence of nerve root changes after lumbar disc incision, even in the absence of mechanical compression.¹⁶

These physiological changes are related to factors such as interleukins, nitric oxide, TNF-alpha, and matrix metalloproteinases, which can sensitize the exposed nerve root to the nucleus pulposus. Furthermore, in some cases of persistent leg pain after lumbar disc herniation surgery, the cause may be attributed to structural changes, chronic inflammation, epidural fibrosis, or a combination of these factors.¹⁰

The diagnosis and prognosis of chronic low back pain, or chronic sciatica, involves a comprehensive approach that includes various assessment methods. These methods aim to identify the underlying cause of the pain and determine the patient's prognosis.¹⁵

Initially, a complete clinical history is taken, in which the patient describes the symptoms, the duration of the pain, and factors that may trigger or alleviate it. Furthermore, comorbidities and possible previous injuries to the lower back are investigated. This information provides important clues for the differential diagnosis.

A physical examination is a fundamental step in the evaluation of chronic lumbosciatic pain. It includes a series of tests and assessments to identify signs of neurological impairment and determine the extent of the dysfunction. During the examination, muscle strength tests are performed, assessing the strength of the muscles related to the lumbosacral nerve roots. 9 Sensory tests are performed to identify areas of loss of sensation in a dermatomal pattern. Furthermore, deep tendon reflexes are assessed, and the Lasegue test, which involves raising the leg straight, is performed to check for radiating pain.^{6,11}

Imaging is an essential tool for diagnosing chronic lumbosciatic pain. Magnetic resonance imaging (MRI) of the lumbar spine is widely used to evaluate the structure and identify possible abnormalities, such as herniated discs, spinal stenosis, or other degenerative changes. In cases where MRI is unavailable or contraindicated, a computed tomography (CT) scan with myelogram may be performed to assess the condition of the nerve roots, as well as the presence of compression or inflammation.⁸

The prognosis for chronic low back pain varies depending on the underlying cause, the extent of the injury, and the response to treatment. In cases of mild to moderate injuries that do not involve severe nerve root compression, the prognosis is generally good. Appropriate treatment, which may include medication and physical therapy, including manipulation techniques and self-care measures, can alleviate symptoms and improve function.⁹

However, in more severe cases, where there is significant nerve root compression or extensive structural injuries with major motor impairment, the prognosis can be more challenging. In these situations, more invasive treatment options, such as surgery, may need to be considered.^{4,6}

Spinal manipulation has beneficial effects on low back pain, promoting separation of the joint surfaces, improving smooth joint gliding, and increasing the space between them. This results in decreased pain due to the release of cytokines, stimulation of mechanoreceptors, and increased blood flow. Previous studies have reported successful treatment of chronic low back pain through functional restoration programs. For example, a 26-year-old woman experienced resolution of her L5-S1 disc protrusion and relief of S1 nerve root compression after a nine-week program, which was continued for 14 months.¹³

In a study involving 60 individuals with subacute low back pain, the effect of spinal mobilization with leg movement on low back pain, leg pain, and the Oswestry Disability Index was evaluated. The group that received spinal mobilization combined with exercise and electrotherapy showed significantly greater improvements in pain, disability, and range of motion compared to the control group, which received only exercise and electrotherapy.¹⁶

The results of our study showed similar conclusions. The control group showed less stable results at the end of the study, with some participants returning to their previous pain and disability scores after three months of intervention. This may be attributed to differences in the procedures used, as well as the inclusion of patients with chronic low back pain, which may have influenced the pattern of improvement in the control groups.¹⁶

It is important to emphasize that spinal manipulation for the treatment of lumbar disc herniation has been considered safe, with minimal reported risks. Patient satisfaction also increases with this type of intervention. In our study, participants did not report worsening of their symptoms, and some patients in the control group did not experience a favorable improvement in symptom severity.¹³

The need for surgical intervention, the appropriate timing for surgery, and surgical approaches have been extensively studied, but controversy remains. Current guidelines for the treatment of low back pain favor an initial conservative approach, which includes patient education, encouragement of physical activity, manual therapy such as McKenzie exercises, and the use of nonsteroidal anti-inflammatory drugs (NSAIDs).¹⁶

McKenzie exercises have been shown to provide some acute symptomatic relief in patients undergoing conservative treatment for low back pain. It is important to emphasize that each case must be evaluated individually, and treatment should be personalized according to the patient's condition and response to different

types of intervention. Guidance from specialized health professionals, such as physicians and physical therapists, is essential to determine the best therapeutic approach for each patient.⁵

The study published by Kostadionovic et al. (2020) compared two exercise programs for the treatment of chronic low back pain and evaluated their clinical efficacy. The closed kinetic chain lumbar stabilization (CLC) exercise program was compared to the closed kinetic chain lumbar stabilization and thoracic mobilization (CLC) exercise program. The study involved 80 patients with chronic low back pain and lumbosciatica of both sexes, divided into two groups. Participants received laser therapy, transcutaneous electrical nerve stimulation, and eight weeks of kinesiotherapy that included exercises to strengthen the deep stabilizers of the lumbar spine. Assessments were performed after four and eight weeks. The results showed that the LSTMC group had a statistically significant ($p < 0.05$) superior recovery compared to the LSCO group at all measurement intervals in terms of pain intensity and functional disability. It was concluded that patients who performed the lumbar stabilization and closed kinetic chain thoracic mobilization exercise program had the most effective reduction in pain intensity and functional disability.⁶

Rogerson et al. (2018) discussed how lumbar disc surgery is a common procedure in the United States and generally presents positive results in most patients. However, some patients may continue to experience leg pain even after surgery. This article aimed to review the common causes of persistent low back pain after lumbar disc surgery. The review was based on an extensive analysis of the existing literature, combined with the authors' experience.

Common causes of persistent leg pain after surgery include reherniation, epidural fibrosis, biochemical and physiological changes in the nerve root, and psychosocial issues. Managing patients with persistent pain after surgical treatment for lumbar disc herniation can be a clinical challenge. This article provides a summary of these topics and presents available treatment options.¹⁷

Kreiner et al. (2014) describe a systematic review and evidence-based clinical guideline for the diagnosis and treatment of lumbar disc herniation with low back pain. The guideline was developed by a working group composed of multidisciplinary spine care specialists trained in the principles of evidence-based analysis. Twenty-nine clinical questions were formulated and addressed through a literature search in various databases, with the literature being evaluated according to the group's standardized levels of evidence. Responses and recommendations were classified according to the strength of the supporting literature.

The guideline concludes that it was created based on the best available evidence and aims to assist healthcare professionals in the care of patients with symptomatic lumbar disc herniation and low back pain. The full document, including evidence tables, suggestions for future research, and all references, is available electronically on the NASS (North American Spine Society) website and will be updated regularly.¹⁶

In summary, this clinical guideline provides an evidence-based educational tool to guide the diagnosis and treatment of lumbar disc herniation and low back pain, using the best available evidence in the field.¹⁶

Ghasabmahaleh et al. (2020) evaluated the effectiveness of spinal manipulation in the treatment of non-acute low back pain. A randomized clinical trial was conducted with patients presenting with unilateral radicular low back pain lasting more than 4 weeks. Patients were randomly divided into two groups: manipulation and control. The primary objective was to assess low back pain intensity, and the secondary objective was to assess the Oswestry Disability Questionnaire score and spinal range of motion.

Both groups experienced significant reductions in back and leg pain. However, the manipulation group showed significantly better results on the Oswestry scores and the straight leg raise test. Furthermore, all ranges of motion significantly increased with manipulation, while the control group improved only on some measures of movement. Between-group analyses showed significantly better results for the manipulation group on all measures. Spinal manipulation improves physical therapy outcomes over a three-month period for patients with subacute or chronic low back pain. This indicates that manipulation may be an effective treatment option for this condition.³

Stochkendahl et al. (2017) summarized the recommendations of two Danish Health Authority guidelines for the non-surgical treatment of nonspecific low back pain and recent-onset low back pain (up to 12 weeks). The study used the GRADE approach and two multidisciplinary working groups to formulate the recommendations.¹

In total, sixteen evidence-based recommendations and four consensus recommendations were presented. The management of low back pain and low back pain should include information on prognosis, warning signs, and advice to remain active. If treatment is necessary, the guidelines suggest the use of patient education, different types of supervised exercises, and manual therapy. Conversely, the guidelines recommend against the use of acupuncture, routine imaging, targeted treatment, extraforaminal injection of glucocorticoids, paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), and opioids. These recommendations are based on low- to moderate-quality evidence or consensus, but are consistent with international guidelines. The guideline working groups recommend intensifying research efforts on all aspects of the management of nonspecific low back pain and lumbosciatica.¹

In summary, conservative treatment of lumbosciatica offers an effective and safe approach to managing this condition. Through an appropriate combination of interventions, such as patient education, therapeutic exercises, manual therapy, and appropriate medications, healthcare professionals can improve outcomes and promote patient recovery. Adopting a multidisciplinary approach and continually seeking scientific evidence are essential to optimizing the quality of care provided to these patients.

IV. Conclusion

This paper explored topics related to the conservative treatment of low back pain, emphasizing the importance of non-surgical approaches to managing this condition. Based on the information discussed, it can be concluded that conservative treatment plays a fundamental role in relieving pain, improving function, and promoting patient recovery. Evidence presented points to the effectiveness of conservative interventions, such as patient education, therapeutic exercises, manual therapy, and the use of appropriate medications. These approaches aim to reduce pain, improve mobility, strengthen muscles, and promote functionality, allowing patients to resume their daily activities and improve their quality of life.

Conservative treatment has been shown to be a safe option, with a lower risk of complications compared to surgical intervention. Furthermore, the importance of a multidisciplinary approach, involving different healthcare professionals, was emphasized to provide comprehensive and personalized care to patients. This involves collaboration between physical therapists, physicians, occupational therapists, and other specialists to develop an individualized treatment plan tailored to each patient's specific needs.

It is important to emphasize that continued research is needed to improve understanding of the mechanisms underlying low back conditions, as well as to investigate the effectiveness of new conservative treatment approaches. Randomized clinical trials, meta-analyses, and systematic reviews are essential to provide robust evidence and inform clinical practices.

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