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Review Article

A Clinical Review on Non- Surgical Management of Sciatica Pain in Adults

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ABSTRACT

Sciatica, a most common type of neuropathic pain caused by impingement of the sciatic nerves or damage to the sciatic nerves. A physical examination and taking a history are the primary methods used to diagnose sciatica. Clinical guidelines recommend mainly non-surgical interventions for patients with sciatica. Exercise has shown significant effects in pain management. The role of smoking in sciatica is unknown. Recommendations for the use of manipulative therapy in patients with sciatic pain are based on indirect evidence. Literature shows that warm needle acupuncture may be more effective than ordinary acupuncture in the treatment of sciatica. Neural mobilization may be an effective tool for short-term improvements in pain. Muscle energy technique can enhance range of motion, and reduce pain. Nonsteroidal anti-inflammatory drugs are one of the most frequently prescribed drugs for the treatment of sciatica. Muscle relaxants are effective for short-term symptomatic relief. There was no evidence found to support the use of pregabalin or gabapentin for sciatica pain. Findings provide new insight into the neuroprotective and neurotrophic effects of dexamethasone and support the application of these agents in clinical treatment of peripheral nerve injury. Plant-derived medicines have the potential to improve the quality of life and functional ability of sciatica patients by relieving symptoms. Ferulic acid exhibits a potential advantage in the treatment of sciatica. ALCAR is currently used for the treatment of neuropathic pain. The use of TNF- α inhibitors to treat sciatica is inadequate. A solution of L-lysine aescinate can be used to relieve pain symptoms. The results of this study will be helpful to patients and physicians as they weigh numerous options for the best course of therapy.

INTRODUCTION

Sciatica, a most common type of neuropathic pain caused by impingement of the sciatic nerves or

damage to the sciatic nerves, affects up to 10% of individuals with persistent lower back pain; its lifetime incidence has been reported to range from

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10% to 40% [1] or even up to 70%. [2] The sciatic nerve is the largest nerve in humans, originating in the lower back and traveling posterior through the lower limb as far down as the heel of the foot. The sciatic nerve innervates a significant portion of the skin and muscles of the thigh, leg, and foot. [3, 4] The prevalence of sciatica varies considerably ranging from 3.8% in the working population to 7.9% in nonworking population. It is most prevalent in people during their 40s and 50s and men are more commonly affected than women. [5] Symptoms may be localized to the lower back or radiate to the leg, buttock, or hip, differentiating it from Sciatica syndrome. This condition disrupts daily activities and diminishes the quality of life. [6]

Sciatica is mainly diagnosed by history taking and physical examination. By definition patients mention radiating pain in the leg. They may be asked to report the distribution of the pain and whether it radiates below the knee and drawings may be used to evaluate the distribution. Sciatica is characterized by radiating pain that follows a dermatomal pattern. Patients may also report sensory symptoms. Physical examination largely depends on neurological testing. The most applied investigation is the straight leg raising test or Lasègue's sign. Patients with sciatica may also have low back pain but this is usually less severe than the leg pain. [7] No history items or physical examination tests have both high sensitivity and high specificity. The pooled sensitivity of the straight leg raising test is estimated to be 91%, with a corresponding pooled specificity of 26%. [8] The only test with a high specificity is the crossed straight leg raising test, with a pooled specificity of 88% but sensitivity of only 29%. [8] Overall, if a patient reports the typical radiating pain in one leg combined with a positive result on one or more neurological tests indicating nerve

root tension or neurological deficit the diagnosis of sciatica seems justified.

Clinical guidelines recommend mainly non-surgical interventions for patients with sciatica, such as educational care and physical activity. Surgical interventions are only considered when nonsurgical interventions are unsuccessful.[9,10] In fact, there is a lack of high-certainty evidence that surgical interventions are superior to non-surgical interventions in sciatica, even for patients with a clear surgical indication.[11] Systematic reviews with pairwise meta-analyses have indicated that it is unclear whether any specific intervention— e.g. exercise, traction, bed rest, manipulation, medication, or no intervention—is superior to placebo or any other intervention for managing sciatica.[12,13] Network meta-analysis (NMA) is an analysis technique which offers a unique opportunity for comparing multiple interventions in one analytical model.[14] However, previous NMAs in people with sciatica did not comprehensively analyze a broad array of non-surgical interventions,[15-17] excluded combined interventions, and are now based on outdated literature searches. [18]

A review of pharmacological interventions for sciatica is important because people with sciatica commonly present in primary care. Analgesic and adjuvant pain drugs are often prescribed for patients with sciatica.[19] Patients with a clinical diagnosis of sciatica are about five times more likely to take drugs than those with low back pain only.[20] Drugs commonly prescribed for the management of sciatica include non-steroidal anti-inflammatory drugs (NSAIDs), skeletal muscle relaxants, opioid analgesics, benzodiazepines, systemic corticosteroids, antidepressants, and anticonvulsants.[21,22] While guidelines provide clear and generally consistent recommendations for the prescription of drugs for non-specific low



back pain,[23,24] this is not the case for sciatica. At present the efficacy and tolerability of commonly prescribed drugs for the management of patients with sciatica has not been established. The problem is that there are no reviews that specifically focus on these drugs that are used in primary care to manage sciatica. Because most guidelines recommend a course of conservative care before surgery is considered, it is imperative to understand what best practice conservative care should entail. In this review we are providing high-quality evidence on the effects of non-pharmacological and pharmacological therapies for sciatica pain and to highlight areas of uncertainty and gaps in the evidence regarding the effects of non-pharmacological and pharmacological interventions for people with sciatica.

NON-PHARMACOLOGICAL THERAPIES FOR SCIATICA PAIN

Exercise

Exercise, as a non-pharmacological intervention, has shown significant effects in pain management. A low-impact program combining physiotherapy and exercise therapy aims to enhance core strength, flexibility, and core mechanics. It mainly reduces pain through several mechanisms. First, exercise promotes blood circulation, accelerates tissue repair and inflammation resolution, which is the key to relieving acute and chronic pain. At the same time, it enhances muscle strength and flexibility, improves body posture, and reduces pain caused by poor posture or muscle tension. Secondly, exercise's positive regulation of the nervous system is also an important way to relieve pain. It can stimulate the endogenous analgesic system, release natural analgesic substances such as endorphins, regulate the transmission of pain signals, and reduce pain perception. In addition, exercise promotes neuroplasticity, including

neuron regeneration and synaptic reconstruction, which helps restore damaged nerve function and relieve neuropathic pain.[25]

Smoking Cessation

The role of smoking in sciatica is unknown. A study aimed to estimate the effect of smoking on lumbar radicular pain and clinically verified sciatica. Comprehensive literature searches were conducted. Twenty-eight, 8 case control and 13 cohort studies qualified for a meta-analysis. Current smokers had an increased risk of lumbar radicular pain or clinically verified sciatica. Former smokers had only slightly elevated risk than never smokers. The associations did not differ between men and women, and they were independent of study design. It was concluded that smoking is a modest risk factor for lumbar radicular pain and clinically verified sciatica. Smoking cessation appears to reduce, but not entirely eliminate, the excess risk. [26]

Spinal Manipulative Therapy

Spinal manipulative therapy has already been widely investigated in patients with low back pain and has been shown to be effective in chronic patients. Recommendations for the use of manipulative therapy in patients with sciatic pain are based on indirect evidence, relying on studies with chronic low back pain. The benefits and harms of spinal manipulative therapy are not widely studied in patients with sciatic pain. A Systematic review showed that there is uncertainty about the efficacy of spinal manipulative therapy (SMT) for patients with acute, subacute, and chronic sciatic pain. Healthcare professionals should carefully evaluate treatment options for patients with sciatic pain. Further research is needed to evaluate the efficacy of manipulative therapy in patients with sciatic pain. [27]



Warm Needle Acupuncture

Acupuncture has been widely used in clinical practice in China and many western countries. There are many clinical reports, systematic reviews and meta-analysis on acupuncture for sciatica. Among the numerous acupuncture therapies, warm needle acupuncture (WNA) can better combine the advantages of acupuncture and moxibustion, which has not only the analgesic effect of acupuncture but also has the warming effect of moxibustion. Some studies have shown that WNA has better effects in relieving pain and promoting blood circulation compared with simple acupuncture or moxibustion. After searching the database, the authors found that there were many RCTs about WNA in the treatment of sciatica. These literature shows that WNA may be more effective than ordinary acupuncture in the treatment of sciatica. [28]

Neural Mobilization

Neural mobilization refers to the therapeutic practice of applying mechanical forces to nerves in the body, with the goal of restoring healthy movement. Nerves must be able to move within the nerve bed (i.e. surrounding tissue) for normal movement to occur, and tolerate strain, compression, and transverse movement along the nerve bed. Some NM techniques directly mobilize the neural tissue (e.g. nerve glide, nerve flossing) via either active (e.g. exercise) or passive (e.g. manual therapy) techniques. Others indirectly mobilize the nerves via movement of the surrounding tissues (e.g. spinal mobilization). NM may be an effective tool for short-term improvements in pain, function, and disability associated with LBP. [29]

Muscle Energy Technique

The management paradigm for LBP has shifted toward non-invasive, patient-centered approaches, emphasizing manual therapy techniques for their effectiveness and safety. Among these, muscle energy technique (MET) and positional release technique (PRT) have become prominent in clinical rehabilitation settings. MET is an active intervention that utilizes voluntary patient muscle contractions against therapist-applied resistance to address joint and muscle dysfunction, enhance range of motion (ROM), and reduce pain. Evidence indicates that MET can improve functional outcomes in chronic LBP by reducing hypertonicity and optimizing biomechanical alignment. Conversely, PRT is a passive, comfort-based positioning technique aimed at reducing nociceptive input and muscle hypertonicity, especially effective for acute pain and trigger points. [30]

PHARMACOLOGICAL THERAPIES FOR SCIATICA PAIN

NSAIDs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are one of the most frequently prescribed drugs for the treatment of sciatica. A previous Cochrane review on the efficacy of NSAIDs summarized findings for acute and chronic low back pain (LBP) and sciatica. An updated systematic review included 10 trials evaluating the efficacy of NSAIDs versus placebo or other drugs in people with sciatica reports low- to very low-level evidence using the GRADE criteria. The efficacy of NSAIDs for pain reduction was not significant. NSAIDs showed a better global improvement compared to placebo. These findings must be interpreted with caution, as the level of evidence according to the GRADE classification was very low for the outcome pain reduction and low for global improvement due to small study samples, inconsistent results, imprecision, and a high risk of



bias in the included trials. While the trials included in the analysis were not powered to detect potential rare side effects, an increased risk for side effects in the short-term NSAIDs use was found. As NSAIDs are frequently prescribed, the risk-benefit ratio of prescribing the drug needs to be considered. [31]

Muscle Relaxants

The use of muscle relaxants in the management of non-specific low back pain is controversial. It is not clear if they are effective, and concerns have been raised about the potential adverse effects involved. The review was aimed to determine if muscle relaxants are effective in the treatment of non-specific low back pain. Randomized and/or double-blinded controlled trials, involving patients diagnosed with non-specific low back pain, treated with muscle relaxants as monotherapy or in combination with other therapeutic modalities, were included for review. It was concluded that Muscle relaxants are effective for short-term symptomatic relief in patients with acute and chronic low back pain. However, the incidence of drowsiness, dizziness and other side effects is high. Muscle relaxants must be used with caution and it must be left to the discretion of the physician to weigh the pros and cons and to determine whether or not a specific patient is a suitable candidate for a course of muscle relaxants. Large high quality trials are needed that directly compare muscle relaxants to analgesics or NSAIDs and future studies should focus on reducing the incidence and severity of side effects. [32]

Neuropathic Painkillers

The Food and Drug Administration (FDA) approved pregabalin for the management of neuropathic pain associated with diabetes mellitus, post herpetic neuralgia, partial-onset seizures and fibromyalgia. Gabapentin has the approval of the

FDA for seizure therapy and post-herpetic neuralgia. Despite the specific indications of gabapentinoids, there is a notable increase in the off-label prescription of, which has raised the concern about the misuse of these drugs since the benefits remain unclear. Therefore, a systematic review to assess the efficacy and safety of gabapentin and pregabalin as treatment for acute sciatic pain was conducted. There was no evidence found to support the use of pregabalin or gabapentin for sciatica pain or low back pain, since the effect is not superior to placebo. In addition, adverse effects of different considerations associated with their use have been reported. In view of this, its routine clinical use cannot be supported. [33]

Dexamethasone

Dexamethasone is an anti-inflammatory glucocorticoid that is often used after injury to treat neural inflammation. A study investigated the effects of dexamethasone on functional and histological changes following sciatic nerve crush injury. Dexamethasone was applied through local intramuscular injection around the site of nerve injury to reduce side effects of glucocorticoids administered systemically. To identify the mechanism that possibly mediates the effect of dexamethasone on functional recovery after sciatic nerve crush injury; levels of CD3-positive cells as well as GAP-43 expression were investigated. It was demonstrated that dexamethasone promotes peripheral nerve repair in a rat model of sciatic nerve injury through the inhibition of CD3-positive cell infiltration as well as the upregulation of GAP-43 expression. These findings provide new insight into the neuroprotective and neurotrophic effects of dexamethasone and support the application of these agents in clinical treatment of peripheral nerve injury. [34]

Plant-derived compounds



Sciatica commonly refers to radicular leg pain which is mainly caused by lumbar disc herniation (LDH) and affects the daily functional ability of many patients in the world. However, according to the side effects and short-term benefits of its treatments, new therapeutic agents such as natural products are needed. A study aimed to comprehensively review the effectiveness of plant-derived products for the treatment of sciatica. Most of the plant-derived treatments mentioned in this review belonged to the polyphenol family or contained high concentrations of various polyphenols. From the results obtained, polyphenols relieved sciatica by reducing inflammation and oxidative stress, mainly through the inhibition of mitogen-activated protein kinases pathways. In conclusion, plant-derived medicines have the potential to improve the quality of life and functional ability of sciatica patients by relieving symptoms. However further preclinical and clinical studies are suggested to prove the safety and efficacy of such herbal medicines for Sciatica. [35]

Ferulic Acid

Ferulic acid exhibits a potential advantage in the treatment of sciatica. Ferulic acid can decrease the levels of oxidative stress, inflammation and apoptosis markers in the sciatic nerves of patients with diabetes. Ferulic acid exerts a neuroprotective effect against radiation-induced nerve damage by targeting the NLRP3 inflammasome to enhance learning and memory ability and ameliorate pathological changes in the hippocampal tissues of irradiated mice. In a study, ferulic acid was found to relieve pain in CCI rats, and identified the related mechanisms. The therapeutic effect of ferulic acid on CCI of the sciatic nerve was assessed via behavioral tests, pathological examination, and immuno histochemistry. Next, the underlying mechanism

at the cellular level was investigated to provide additional experimental evidence supporting the application of ferulic acid for the treatment of sciatica. Ferulic acid can alleviate sciatica in CCI rats and inhibit neuroinflammation, promote sciatic nerve repair and exert an analgesic effect via the TLR4/NF- κ B pathway. [36]

Acetyl L Carnitine

Clinical studies in diabetic neuropathy showed that ALCAR accelerated nerve conduction velocities, improved neuroregeneration, and reduced painful symptomatology. Moreover, it is effective in relieving opiate-withdrawal hyperalgesia in animal models. In human beings it is effective on withdrawal symptoms such as muscular tension, muscular cramps, and insomnia. Actually, ALCAR is currently used for the treatment of neuropathic pain. Its long-term analgesic effects are dependent on epigenetic modifications, such as reversible modifications in gene activity. Thus, ALCAR represents a consistent therapeutic option for peripheral neuropathies. Its complex neurotrophic and analgesic effects open new strategies in the study of peripheral nerve disease management. ALCAR prevents nerve growth factor (NGF), glial cell line-derived neurotrophic factor (GDNF) and Artemin level changes in the CCI model of neuropathy. In particular, ALCAR increased Artemin levels in a pathology-independent manner and induced Artemin expression in dorsal root ganglia and spinal cord of sham animals. This candidates ALCAR as an agent affecting positively painful symptomatology and rescuing damaged nerves. [37]

TNF- Alpha Inhibitors

Disk herniation-induced sciatica is one of the most common causes of lower back and leg pain among young adults. Tumor necrosis factor-alpha (TNF- α) is an inflammatory factor involved in the



pathophysiological mechanism underlying disk herniation-induced sciatica. In the past decade, some scholars have attempted to use TNF- α inhibitors to treat sciatica. Previous non-randomized controlled trials have shown that this type of agent has potential efficacy and a relatively high patient tolerance. However, afterwards, various randomized controlled trials (RCTs) demonstrated that these agents yielded inconsistent outcomes. A newly published systematic review and meta-analysis revealed that the evidence supporting the use of TNF- α inhibitors to treat sciatica is inadequate. According to the currently existing evidence, other than reducing the RR of discectomy of the radicular block (combined endpoint) at the medium-term follow-up, TNF- α inhibitors have limited clinical value in the treatment of sciatica caused by disc herniation and/or spinal stenosis. [38]

L Lysine Aescinate

The efficacy of commonly prescribed analgesic and adjuvant drugs for the management of patients with radiculopathy has not been well established. Oral steroids are commonly used to treat sciatica or radiculopathy due to a herniated disk but the effect remains controversial. L-lysine aescinate showed superiority over placebo or baseline therapy with NSAIDs alone in treating sciatica, but have not been evaluated in an appropriately powered clinical trial. Randomized, double-blind clinical trial conducted in two health centers revealed that the level of pain improvement at 15th days after initiation of therapy with dexamethasone or solution of L-lysine aescinate at doses of 5 or 10 mL was not significantly different. The lowest levels of pain were achieved in patients who received the L-lysine aescinate 10 mL, but the range of decrease in pain was slightly greater in the group administered dexamethasone. It was concluded that patients with acute radiculopathy

due to a herniated lumbar disk a short course of IV dexamethasone or L-lysine aescinate resulted in pain improvement at 15th and 30th day. Dexamethasone may be preferable if a longer-term analgesic effect is needed. Taking into account side effects of dexamethasone, a solution of L-lysine aescinate can be used to relieve pain symptoms.[39]

CONCLUSION

We come to the conclusion that exercise is essential for reducing both acute and chronic pain because it increases blood flow, speeds up tissue healing, and reduces inflammation. Quitting smoking seems to lessen the additional risk, but not completely remove it. Based on studies with persistent low back pain, recommendations for the use of manipulative therapy in sciatic pain patients are based on indirect data. According to certain research, warm needle acupuncture is more effective than moxibustion or basic acupuncture at reducing pain and increasing blood flow. Neural mobilization may be a useful strategy for improving LBRP-related pain, function, and handicap in the near term. The muscular energy approach is an active intervention that addresses joint and muscle dysfunction, improves range of motion (ROM), and lessens discomfort by using voluntary patient muscle contractions against resistance given by the therapist.

Since NSAIDs are often recommended, it is important to weigh the risks and benefits of doing so. Patients with both acute and chronic low back pain can benefit from muscle relaxants for short-term discomfort alleviation. Pregabalin and gabapentin do not have a better effect than a placebo, hence there is no evidence to support its usage for sciatica or low back pain. Results support the use of these drugs in the therapeutic treatment of peripheral nerve damage and offer fresh insight into the neuroprotective and



neurotrophic effects of dexamethasone. By reducing symptoms, medications made from plants may help sciatica sufferers live better lives and be more functional. Ferulic acid shows promise as a sciatica therapy. For peripheral neuropathies, acetyl carnitine is a reliable treatment choice. When it comes to treating sciatica brought on by disk herniation and/or spinal stenosis, TNF- α inhibitors are not very useful. Considering the adverse effects of dexamethasone, pain symptoms can be alleviated with an L-lysine aescinate solution. In addition to serving as evidence and reference data for future design of a large-scale main study, the results of this study will be helpful to patients and physicians as they weigh numerous options for the best course of therapy.

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