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Physiotherapy in Sciatica Management: Current Insights and Future Directions

Mohammed Jalal Alnassar [(1)], Abdullah Fahd Alobaid [(2)], Dhafer Hassan Dhafer Alshehre [(3)], Abdullah Zaid Bin Grain [(4)], Saad Abdulaziz Bin Muaythir [(5)], Nasser Abdulrhman Alnafesah [(6)], Abduallah Saleh S. Almutiri [(7)], Fatimah Ahmed Hakami [(8)], Mada Mohammed Ahmed Hussain [(9)], Kholod Mohammed Ali Khamis [(10)], Amal Abdullah Ali Aref [(11)], Mariam Ali Abas Shawlan [(12)], Mohameed Abduaziz Saleh Almasuod [(13)], Sumaiah Mohammed Ageeli [(14)], Ahmed Ali Hassan Jaafari [(15)]

[1]Physical Therapist, Aliman General Hospital, Ministry of Health, Kingdom of Saudi Arabia. Pt_malnassar@hotmail.com
[2]Physiotherapy, Aliman General Hospital, Ministry of Health, Kingdom of Saudi Arabia. Afobaid@moh.gov.sa
[3]Physical Therapist, Department of Medical Rehabilitation, Ministry of Health, Kingdom of Saudi Arabia. dhafer.pt@gmail.com
[4]Physical Therapist, Department of Medical Rehabilitation, Ministry of Health, Kingdom of Saudi Arabia. aga303@hotmail.com
[5]Physical Therapist, Department of Medical Rehabilitation, Ministry of Health, Kingdom of Saudi Arabia. saadhtc1x1@gmail.com
[6]Physical Therapist, Department of Medical Rehabilitation, Ministry of Health, Kingdom of Saudi Arabia. nasser0005@yahoo.com
[7]Physiotherapist, Branch of the Ministry of Health in Riyadh Region, Ministry of Health, Kingdom of Saudi Arabia. ab3688@hotmail.com
[8]Physiotherapist, Aldarb, Ministry of Health, Kingdom of Saudi Arabia. fatmah@moh.gov.sa
[9]Physiotherapist, Damad general hospital, Ministry of Health, Kingdom of Saudi Arabia. madamh@moh.gov.sa
[10]Physiotherapist, Damad General Hospital, Ministry of Health, Kingdom of Saudi Arabia. Khkhamis@moh.gov.sa
[11]Physical Therapy, Jazan General Hospital, Ministry of Health, Kingdom of Saudi Arabia. aaarif@moh.gov.sa
[12]Physiotherapy, Damad General Hospital, Ministry of Health, Kingdom of Saudi Arabia. Msholan@moh.gov.sa
[13]Prosthetics Technician, King Khaled Hospital in Al-Kharj, Ministry of Health, Kingdom of Saudi Arabia. malmasuod@moh.gov.sa
[14]physiotherapy, Eradah Hospital for Mental Health at Jazan, Ministry of Health, Kingdom of Saudi Arabia. suageeli@moh.gov.sa
[15]Physiotherapy, Prince Mohammed bin Nasser Hospital, Ministry of Health, Kingdom of Saudi Arabia. a8s2022@hotmail.com

ABSTRACT

Sciatica, a condition characterized by pain radiating from the buttock down the course of the lumbosacral nerve roots, is a common and often debilitating condition.

While the reported prevalence and incidence vary due to differences in definitions and data collection methods, estimates suggest a significant burden on healthcare systems and economies worldwide. Sciatica is mostly caused by a herniated lumbar disc, resulting in nerve root compression and inflammation. Diagnosis relies on a combination of patient history and physical examination findings, with routine imaging not recommended unless specific underlying causes are suspected. Conservative management is the initial approach, focusing on patient education, advice to remain active, and exercise therapy. Spinal manual therapy may provide short-term benefits, but guideline recommendations vary due to the limited persuasiveness of evidence. Medication use for sciatica remains uncertain, as most medications provide limited additional benefits compared to placebo and carry the risk of significant side effects. Surgical intervention may be considered when conservative management fails to yield significant improvement, offering modest short-term benefits in pain relief and functional outcomes. Future research should focus on understanding the pathogenic role of inflammation, refining classification systems, and integrating clinical findings, biomarkers, and physical assessments to improve diagnostic and therapeutic approaches. Optimizing physiotherapy care for sciatica requires a patient-centered approach that incorporates emerging evidence and addresses individual preferences to ensure effective and sustainable management.

Keywords: Physiotherapy, Sciatica, Sciatica Management

Introduction

The association between lumbar spine pathology and leg pain has been recognized since ancient times, with early references found in Greek and Egyptian texts. Hippocrates is credited with first using the term "sciatica," derived from the Greek word for hip, *ischios* (Truumees, 2015). Although the term "sciatica" is widely used, it is often a source of confusion, as it has been employed to describe various forms of back or leg pain (Konstantinou & Dunn, 2008). In most contexts, including this paper, sciatica refers to pain radiating from the buttock down the course of the lumbosacral nerve roots (Frymoyer, 1988). Another commonly used term for sciatica is lumbar radiculopathy (Stochkendahl et al., 2018). The reported prevalence and incidence of sciatica in the literature vary significantly, primarily due to differences in definitions and data collection methods. According to Cherkin, the incidence of sciatica is approximately 5 per 1000 individuals in Western countries (Cherkin et al., 1994). In the Netherlands, 117,200 new cases of sciatica were recorded in 2017. A Danish study recently reported that the prevalence of sciatica among patients with low back pain in primary care settings ranged from 2% in chiropractic clinics to 11% in general practices (L. Hartvigsen et al., 2017). While the economic impact of low back pain is well-documented (J. Hartvigsen et al., 2018), the economic burden of sciatica has received less attention. Estimates in the Netherlands suggest that the direct and indirect costs associated with sciatica amount to approximately €1.2 billion annually. In the United Kingdom, healthcare costs related to sciatica are estimated at £500 million, with indirect costs reaching £3.8 billion (Kigozi et al., 2019).

What is Sciatica?

Sciatica is most commonly caused by a herniated lumbar disc, where disc material ruptures through the surrounding annulus, compressing the nerve root (Ropper & Zafonte, 2015). Less common causes include spondylolisthesis, lumbar stenosis, foraminal stenosis, and malignancy. The unifying factor in these conditions is the compression of the lumbar nerve root, which can lead to inflammation (Ropper & Zafonte, 2015; Valat et al., 2010). Evidence suggests that sciatica results not solely from mechanical pressure on the nerve root but from a combination of mechanical, inflammatory, and immunological factors (Stafford et al., 2007).

Diagnosis

The diagnosis of sciatica relies primarily on the patient's history and physical examination findings, as no single symptom or test provides sufficient sensitivity or specificity to confirm the condition. Clinical guidelines recommend using a combination of history and physical examination findings for diagnosis (Stochkendahl et al., 2018). Key indicators to be assessed during history taking include the predominance of leg pain over back pain, the radiation of pain below the knee (aligned with one or more dermatomes), paraesthesia or sensory loss consistent with the dermatomes of the affected nerve root, weakness or reflex changes in a myotomal distribution, and exacerbation of leg pain with coughing, sneezing, or deep breathing. A gradual onset of symptoms generally increases the likelihood of sciatica, although symptoms can occasionally manifest suddenly and be severe and persistent. Positive findings on physical tests, such as loss of muscle strength (e.g., subtle dorsiflexion weakness of the foot in L5 involvement), increased finger-floor distance (>25 cm), absence of tendon reflexes, a positive straight leg raise test, or a positive crossed straight leg raise test, add diagnostic value (Vroomen, De Krom, & Knottnerus, 1999; Vroomen et al., 2002). When these signs, symptoms, and tests consistently point to one nerve root, a sciatica diagnosis becomes more probable.

It is essential to exclude serious underlying conditions, such as trauma, malignancy, or infections, during the diagnostic process. Symptoms like saddle anaesthesia, bladder disturbances, anal sphincter tone loss, or reduced sexual function may indicate cauda equina syndrome, which requires urgent medical attention (Kapetanakis et al., 2017).

Routine imaging is not recommended for diagnosing sciatica, consistent with guidelines for non-specific low back pain, which discourage routine imaging unless specific underlying causes are suspected (Oliveira et al., 2018). Despite these guidelines, many patients have undergone imaging before presenting to physiotherapy consultations, necessitating a review of imaging findings to determine concordance with clinical symptoms.

Prognosis

While the general consensus is that sciatica has a favorable prognosis, as most cases are self-limiting with symptoms decreasing over time (Vroomen, De Krom, Wilmink, et al., 1999), evidence regarding its natural course remains inconclusive. Many studies examining low back pain do not differentiate between cases with and without leg symptoms or sciatica (Costa et al., 2012). A recent UK study focusing on

patients seeking primary care for back-related leg pain, including sciatica, found that only 55% of sciatica patients achieved a ≥30% reduction in disability after one year (Konstantinou et al., 2018). As these studies involved some form of conservative treatment, the untreated prognosis of sciatica remains unclear. A review examining prognostic factors in sciatica patients undergoing conservative treatment found inconsistent, predominantly negative results regarding baseline pain severity, neurological deficits, nerve root tension signs, symptom duration, and radiological findings (Ashworth et al., 2011).

Conservative Management

The initial approach to managing sciatica is conservative, focusing on educating the patient about the condition and the role of imaging, as well as providing advice to remain active.

Information

Patient education should involve an explanation of the nature and expected prognosis of sciatica. It is essential to discuss the limited role of imaging, which is generally not recommended unless there are specific indications, such as suspected cauda equina syndrome or fractures. This discussion is crucial because imaging is frequently performed either to reassure the patient or to meet their expectations. However, no clear evidence supports the routine use of imaging in guiding conservative management or predicting outcomes. A notable example is provided by Herzog et al., who described a 63-year-old woman with low back pain and right L5 radicular symptoms who underwent imaging at ten accredited regional centers over three weeks (Herzog et al., 2017). Despite all centers being certified by the American College of Radiology, no single finding was unanimously reported, and one-third of the findings appeared only once across the ten reports. The authors concluded that this variability reflected either significant differences in radiological standards or a high prevalence of interpretive errors (Herzog et al., 2017). A systematic review of 14 high-quality case-control studies involving over 3,000 participants found significant associations between MRI-detected abnormalities such as disc bulge, disc degeneration, and Modic 1 changes—and back pain, yet the causal relationship remained unclear (Brinjikji et al., 2015). Furthermore, lumbar disc herniation is often subject to spontaneous regression (Chiu et al., 2015).

Routine imaging may also have negative psychological effects. A randomized trial assessed the impact of knowledge of diagnostic findings on clinical outcomes in acute low back pain and radiculopathy (Ash et al., 2008). Among 246 participants (39% with radiculopathy), patients and physicians were either blinded to MRI results or provided results within 48 hours. While primary clinical outcomes such as disability, pain, and sick days showed no differences, the blinded group demonstrated greater improvement in general health as measured by the Short Form 36 quality of life questionnaire (Ash et al., 2008).

Advice to Stay Active

In patients with symptoms lasting less than 6 to 8 weeks, encouraging physical activity is a fundamental component of conservative management. Clinical guidelines emphasize the importance of remaining active while discouraging bed rest. A systematic review comparing "advice to stay active" with "structured exercises" found low-quality evidence (as per the GRADE framework) that exercise offers small, short-term benefits for leg pain (Fernandez et al., 2015). This meta-analysis, based on five randomized trials, showed an 11-point difference (95% CI 1 to 22) on a 0-to-100 pain scale. The exercise interventions varied in duration (4 to 8 weeks) and type, including postural instruction, lumbar stabilization, motor control, muscle strengthening, and directional preference exercises. However, no differences were observed in short-term disability (Fernandez et al., 2015). Moderate-quality evidence suggested similar long-term effects of advice to stay active and exercise on leg pain (MD −3, 95% CI −9 to 3) and disability (MD −2, 95% CI −8 to 5) on the same scale. Collectively, both approaches appear to be similarly effective, although exercise may be prioritized when leg pain is the primary symptom.

Exercise Therapy

Clinical guidelines provide varying recommendations regarding exercise therapy due to inconclusive evidence. The Danish multidisciplinary guidelines suggest considering supervised exercises in addition to usual care, including directional exercises, motor control exercises, nerve mobilization, or strength exercises, but do not endorse a specific type of exercise. In clinical practice, exercises should align with patient complaints, preferences, and the physiotherapist's expertise. In contrast, Dutch guidelines specifically addressing sciatica in primary care recommend exercise therapy when symptoms persist beyond 6 to 8 weeks without significant improvement. Exercise therapy is also indicated when patients require more intensive supervision to achieve functional goals or when they exhibit high levels of kinesiophobia.

Spinal Manual Therapy

Physiotherapists and manual therapists commonly offer spinal manual therapy (SMT) as part of sciatica management. SMT refers to various techniques that involve moving joints within their normal range of motion to enhance spinal function. SMT techniques are classified into mobilization (low-velocity, small- or large-amplitude passive movements) and manipulation (high-velocity thrusts over a short range near the end of passive motion) (Rubinstein et al., 2019). While SMT typically yields small, short-term benefits, its overall effects are limited. For example, the Danish guideline identified three randomized trials evaluating SMT as an adjunct to usual care. These trials involved heterogeneous populations, including individuals with MRI-confirmed disc protrusion and intact annulus, those with radiating leg pain of varying durations (mean duration 24 months) with or without neurological symptoms, and individuals with or without radiating leg pain. Interventions ranged from manipulation alone to combinations of manipulation, mobilization, and muscle stretching techniques. The pooled mean difference favored manipulation for back pain on a 0-to-10 numerical scale (MD −1.07, 95% CI −2.00 to −0.14) at 12 weeks.

Spinal Manual Therapy

This evidence has been classified as indirect, yet due to its small and statistically significant effects, the recommendation is that physiotherapists or manual therapists may consider offering spinal manual therapy (SMT) to patients with recent-onset sciatica in addition to standard care. However, given the limited persuasiveness of the evidence, discrepancies in guideline recommendations are evident. For example, the Danish multidisciplinary guideline supports the potential use of SMT, whereas the Dutch general practitioner guidelines do not recommend SMT for sciatica in conjunction with primary care, citing the evidence as too indirect.

There is ongoing discussion regarding adverse events associated with SMT. A recently published systematic review, which included 47 randomized trials encompassing 9,211 participants (23 trials reported adverse events), concluded that most adverse events observed were musculoskeletal, transient, and mild to moderate in severity (Rubinstein et al., 2019). Although this review focused on chronic low back pain with or without referred leg pain, it is unlikely that the findings would differ substantially for sciatica.

Medication

Patients with sciatica often use medication to manage their pain and may seek advice from physiotherapists regarding its effectiveness. Thus, physiotherapists should be familiar with the available evidence on medication use. A systematic review of 23 randomized trials evaluated the effectiveness of various medications, including nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, antidepressants, anticonvulsants, muscle relaxants, and opioid analgesics. The review concluded that in most cases, medication was not substantially more effective than placebo, or the differences were uncertain due to imprecise estimates (Pinto et al., 2012).

For acute sciatica, corticosteroids were found to reduce pain in the short term by 12 points on a 0-to-100 scale (MD −12, 95% CI −21 to −3), supported by moderate-quality evidence according to the GRADE framework. Some trials indicated a small benefit from NSAIDs, but this evidence was classified as low quality (Pinto et al., 2012). Overall, the evidence quality was low, leaving uncertainty about which pain medications are most effective for sciatica. Furthermore, these medications can have significant side effects (Pinto et al., 2017). Consequently, the Dutch general practitioner guideline cautiously recommends pain medication, primarily for patients experiencing severe pain. In contrast, the Danish guideline did not provide recommendations for medication as it fell outside the scope of their review.

A recent systematic review of 27 studies examined the effectiveness of combination drug therapies for pain relief. Most combinations demonstrated no or only minor effects on pain and disability, with low-quality evidence supporting these findings (Mathieson et al., 2019).

Surgical Management

When symptoms persist and significant improvement is absent despite conservative management, referral to a spine surgeon is recommended to evaluate potential indications for lumbar surgery. Surgeons must carefully correlate clinical and imaging findings to identify suitable candidates for surgical intervention. This approach is supported by a recently published systematic review that compared the effectiveness of surgical and non-surgical treatment (Clark et al., 2020).

The review included seven randomized trials with 1,158 participants. It showed that surgery resulted in modest pain reduction—between 6 and 26 points on a 0-to-100 visual analog scale up to 26 weeks post-treatment compared to non-surgical interventions. However, the difference between groups was no longer apparent at one year (Clark et al., 2020). Improvements in physical functioning were minimal, and the reoperation rate ranged from 0% to 10%.

Postoperative Physiotherapy

Recovery rates following conventional microdiscectomy have been reported as 66% at four weeks and 75% at eight weeks (Arts et al., 2009). Return-to-work rates were approximately 15% at two months (Rasmussen et al., 2008). At two years, 71% of patients undergoing tubular discectomy and 77% undergoing conventional microdiscectomy reported good recovery. A systematic review of 39 cohort studies involving 13,883 participants with sciatica found that moderate levels of pain and disability persisted at five years post-surgery (Machado et al., 2016). The mean pain score was 21 (95% CI 13 to 30) on a 0-to-100 scale, and the mean disability score was 13 (95% CI 11 to 16). Postoperative management aims to expedite the return to daily activities or work and prevent chronic symptoms, although the specific content of such management programs varies.

Early Postoperative Management

The timing of postoperative programs represents a key distinction. A randomized trial assessed the effectiveness and cost-effectiveness of early rehabilitation—initiated immediately after lumbar disc surgery—compared to no referral (Oosterhuis et al., 2017). All patients received standard postoperative care during hospitalization (typically 1–2 days), which included one or two sessions with a physiotherapist or nurse for guidance on transfers and daily activities, as well as a booklet with exercise suggestions. Patients in the experimental group began early rehabilitation in primary care within the first week after discharge. This program involved gradually increasing exercise intensity over six to eight weeks. In contrast, the control group did not receive rehabilitation referrals. The study found no clinically significant differences between the early rehabilitation group and the control group for outcomes such as perceived recovery, physical functioning, or pain (Oosterhuis et al., 2017).

Postoperative Management Starting 4–6 Weeks After Surgery

A systematic review evaluated the effectiveness of rehabilitation starting 4–6 weeks post-surgery, analyzing 22 randomized trials with 2,503 participants (Oosterhuis et al., 2017). The programs included in the studies were heterogeneous,

with most programs evaluated in only one trial. Comparisons between various types of rehabilitation—such as multidisciplinary programs, behavioral graded activity, and strength and stretching exercises—showed no significant differences. However, the evidence was of low to very low quality, preventing strong recommendations for any specific rehabilitation program (Oosterhuis et al., 2017).

When physiotherapy was compared with no treatment or education alone, the results indicated better short-term outcomes for pain and physical functioning immediately after treatment. Very low-quality evidence from five trials involving 272 participants suggested that exercise programs were more effective than no treatment for pain in the short term (SMD −0.90, 95% CI −1.55 to −0.24). Similarly, low-quality evidence from four trials with six comparisons and 252 participants indicated that exercises were more effective for short-term functional status (SMD −0.67, 95% CI −1.22 to −0.12). However, for long-term functional status, three trials with 226 participants showed unclear effects (SMD −0.22, 95% CI −0.49 to 0.04) (Oosterhuis et al., 2017).

An interesting finding from one trial within this review was that a multidisciplinary rehabilitation program focused specifically on return-to-work outcomes, coordinated by a medical advisor, resulted in a faster return to work compared to usual care.

Future Directions for Research and Practice

Sciatica is believed to have various pathogenic components, with inflammation hypothesized to play a potential etiological role. Several inflammatory proteins, such as interleukin (IL)-1β, IL-6, IL-8, and tumor necrosis factor-α, have been identified in patients with sciatica. However, the pathogenic mechanisms triggering these inflammatory processes in vivo remain poorly understood (Wuertz & Haglund, 2013). A systematic review investigating the relationship between inflammatory activity and clinical symptoms concluded that substantial clinical heterogeneity among studies precluded any definitive conclusions (Jungen et al., 2019). Key questions remain about the role of inflammation in sciatica, particularly whether certain stages in its progression might see a more prominent inflammatory mechanism. The goal is to explore whether inflammatory biomarkers could predict the clinical course of sciatica and identify patient subgroups most responsive to anti-inflammatory treatments or surgical interventions.

Another important avenue for research involves the classification of patients with sciatica. As noted, sciatica represents a symptom rather than a distinct diagnosis. While leg pain is the common feature, its origins may differ; it may result from spinal nerve root involvement or represent referred (non-specific) pain originating from structures such as ligaments, joints, or discs without spinal nerve root involvement. A recent systematic review identified 22 classification systems for sciatica, highlighting the wide variability in definitions and diagnostic criteria for leg pain among these systems (Stynes et al., 2016). A previous review assessing terminology consistency in randomized trials found inconsistent use of terminology for sciatica (Lin et al., 2014).

Additionally, it revealed that the terms used to define leg pain in trials often did not align with the eligibility criteria of those studies (Lin et al., 2014). There is a pressing need for consensus on unambiguous definitions for leg and back pain to address confusion surrounding descriptors for radiating leg pain. The inconsistency in terminology also reflects the lack of understanding regarding the mechanisms underlying radiating pain. One of the primary challenges in this field is integrating clinical findings, physical test results, and biomarkers into a unified classification system, particularly in primary care, where most sciatica patients are initially assessed and treated.

Given the generally modest effects of exercise therapy, another critical research question is how to optimize these interventions. One potential strategy to enhance the effectiveness of exercise programs, including home-based exercises, involves improving treatment adherence. Exercise adherence is a well-recognized challenge, particularly among patients experiencing pain (Turk & Rudy, 1991). Non-adherence to prescribed home exercises and advice on lifestyle and physical activity are persistent problems (Trost et al., 2002). A qualitative study investigating factors influencing adherence to home exercises and advice following lumbar discectomy revealed wide variability among patients (Ostelo, 2009). Factors affecting adherence included perceptions of surgery's impact, expectations for recovery and treatment, and the nature of patient-therapist interactions during rehabilitation. Addressing these factors allows physiotherapists to customize exercise programs to suit individual patient characteristics and needs. Future research should explore methods for eliciting patient preferences and identify the practical skills physiotherapists need to integrate these preferences into personalized exercise programs. The potential of "blended behavior change interventions," which combine therapeutic guidance with online care, warrants further investigation (Kloek et al., 2017).

Lastly, developing methods to facilitate the implementation of clinical guidelines into daily practice is crucial. Although numerous guidelines exist for managing back pain and sciatica, significant challenges remain in translating these into routine clinical care (Ostelo et al., 2010). Merely distributing guidelines and informational materials to healthcare professionals is insufficient; active implementation strategies are essential. Multifaceted or multicomponent approaches are considered the most effective for successfully implementing guidelines and effecting practice change. However, a systematic review of nine studies, including three cost-effectiveness analyses, found no significant differences in outcomes between multifaceted strategies and control interventions for implementing back and neck pain guidelines (Al Zoubi et al., 2018). Further research is necessary to optimize the uptake of evidence-based practices in clinical settings.

Conclusion

Physiotherapy plays a critical role in the multidisciplinary management of sciatica, encompassing conservative approaches such as education, advice to stay active, exercise therapy, and, in certain cases, spinal manual therapy (SMT). While evidence supports these interventions to varying degrees, limitations in the consistency and quality of findings highlight the need for further research. For example, SMT demonstrates modest benefits but is subject to differing guideline recommendations

due to concerns about the robustness of evidence and potential adverse events. Similarly, the benefits of exercise therapy are generally modest, suggesting the need for strategies to improve adherence and personalize programs based on individual patient preferences and characteristics.

Pharmacological management remains uncertain, as most medications provide limited additional benefits compared to placebo, and the potential for significant side effects warrants cautious use. In cases where conservative management fails to yield significant improvement, surgical intervention may offer modest short-term benefits in pain relief and functional outcomes, though the long-term advantages are less clear.

Future research should focus on understanding the pathogenic role of inflammation, refining classification systems for sciatica, and integrating clinical findings, biomarkers, and physical assessments to improve diagnostic and therapeutic approaches. Furthermore, efforts to enhance the uptake and implementation of clinical guidelines in practice are essential, particularly through active and multifaceted strategies.

Ultimately, optimizing physiotherapy care for sciatica requires a patient-centered approach that incorporates emerging evidence and addresses individual preferences, ensuring a more effective and sustainable management framework.

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