

Review Article

Rehabilitation of Lumbar Radiculopathy: A Clinical Review

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HIGHLIGHTS

Rehab for lumbar radiculopathy involves exercises.
Focus on pain relief and mobility.
Treatment includes physical therapy.
Patient education on proper techniques.
Surgery considered for severe cases.

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ABSTRACT

Lumbar radiculopathy is a common condition characterized by pain, numbness, or weakness that radiates along the sciatic nerve, often caused by compression or irritation of the spinal nerve roots in the lumbar spine. Rehabilitation plays a crucial role in managing lumbar radiculopathy, aiming to reduce pain, improve function, and enhance quality of life for affected individuals. This clinical review examines the current evidence-based rehabilitation strategies for lumbar radiculopathy. It discusses the importance of early diagnosis and individualized treatment plans, considering factors such as the severity of symptoms, underlying causes, and patient preferences. The review highlights the effectiveness of various rehabilitation interventions, including physical therapy, exercise programs, manual therapy, and modalities such as ultrasound and electrical stimulation. These interventions aim to improve lumbar spine stability, increase flexibility, and strengthen the surrounding muscles to support the spine and reduce pressure on the affected nerves. Additionally, the review discusses the role of patient education in rehabilitation, emphasizing the importance of understanding the condition, proper body mechanics, and lifestyle modifications to prevent further injury and promote recovery. It also addresses the potential benefits of psychological interventions, such as cognitive-behavioral therapy, in managing the emotional and psychological aspects of chronic pain associated with lumbar radiculopathy. Overall, this clinical review provides valuable insights into the comprehensive rehabilitation approach for lumbar radiculopathy, emphasizing the multidisciplinary nature of care and the importance of a tailored treatment plan to optimize outcomes for patients.

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INTRODUCTION

Lumbar radiculopathy is a disorder that causes pain in the lower back which radiates down in hip, back of thigh and leg. The damage is caused by the compression of nerve roots from L1-S4. The compression can result into tingling, radiating pain, numbness, paresthesia & sometimes also results in sharp shooting pain[1]. The prevalence of lumbar radiculopathy has been estimated to be 3%-5% of the population, affecting both men & women[1]. Age is a primary risk factor as it occurs secondary to degenerative process within the spine. Other factors include race, hereditary, poor posture, spinal abnormalities or activities that place an excessive or repetitive load on the spine. It has also been observed that patient with lumbar radiculopathy suffers from excruciating, burning, radiating pain through the course of the nerve with decreased sensations, muscle weakness and loss of function.

Posterolateral disc herniation is generally seen among the population because of roots compression below the herniated disc. 95% of disc herniations occur at the L4/L5 disc spaces. Herniations at higher levels are uncommon.

Out of a 12.9% incidence of low back complaints within working population, 11% is due to lumbar radiculopathy. The prevalence of lumbosacral radiculopathy has been situated from 9.9-25% [2]. Robin Mata, Andrew L Sherman (2023): In his study stated that in LR there will be Excruciating, burning or stinging pain, radiating down the leg, there will be decreased sensation in the affected lower extremity, also in more severe cases muscle weakness and loss of function is seen. Radiculopathy in spinal nerve roots L1 - L3 refers to anterior aspect of thigh and typically does not radiate below the knee these levels are affected only in 2-5 % of all disc herniation. Whereas 95-98% of lumbar disc herniations occurs at L4-L5 or L5 -S1 intervertebral levels with involvement of neurological impairments in the motor and sensory dermatomes and myotomes of the L5 -S1 nerve roots corresponding to the dorsum of the foot and lateral aspect of the posterolateral L5 and posterior lower leg and lateral foot S1[3].

It is the leading cause of disability in the developed world and also accounts for billions of dollars in healthcare costs annually. The incidence is estimated to anywhere is between 5% to more than 30 % with a lifetime prevalence of 60 % to 90% percent

internationally⁴. Thus the need of my study is that to aware about rehabilitation of LR because this condition has a very high prevalence nationally and internationally with low rate of awareness among people specifically in rural population. So, I found that awareness programs should be implemented to spread the benefit of physical therapy among LR population through my study so that people could know about various approaches of LR to overcome the disability effectively.

Aim and objective of the study:

Thus, the aim of my study is to evaluate the clinical findings of lumbar radiculopathy and to Summarize the physiotherapeutic treatment options for lumbar radiculopathy and explaining the importance of conservative management in patient care.

Pathophysiology:

Recurrent tortional strains leads to tear of outer annulus, which leads to herniation of nucleus pulposus. cellular senescence of fibro chondrocytes leads to loss of proteoglycan production leading to loss of disc height, decreased disc height increases strain on the annulus fibrosis which leads to disc herniation.

Surgical interventions:

In clinical practice, several procedures are usually adopted by the surgeon, such as: anterior and posterior decompression, laminectomy and minotomy such procedures and done when conservative management fails.⁵

Approaches for Lumbar Radiculopathy:

Guidelines for approaching lumbar radiculopathy favor a conservative management of physical therapy rather than a surgical intervention.

It includes lifestyle modifications and patient education such as:

- . Ergonomic and postural advices.
- . Manual therapy such as McKenzie exercises, SMWLM (Spinal mobilization with leg movement), PINS (Progressive inhibition of neuromuscular structures)[6].
- . Traction and Spinal vertebrae mobilization[7].
- . Stabilization and MDT Exercises[8].
- . Neurodynamic mobilization.
- . Low level LASER and TENS[9].

Material and Methods:

Table-01

Criteria	Inclusion	Exclusion
Study year	2016 -2023	2015 and before
Study design	1.RCT 2.Systematic review 3.Narrative review 4.Meta analysis	1. Manuscript 2. Dissertation
Setting	1. Ortho OPD, IPD. 2. Physiotherapy OPD	1.Surveys 2.camps 3.NGOs

Context	1.Manual therapy (McKenzie exercises, 2.Traction 3. SMWLM, PINS, 4. Spinal vertebrae mobilization), 5. Stabilization exercises, 6.low level LASER and TENS	1.Ultrasound 2.SWD 3.General exercises
Outcome measures	1.VAS 2.SBI 3.HI 4. RMDQ 5.MMT	1.NPRS 2.ODI 1.NPRS 2.ODI

EVIDENCE BASED STUDIES OF PHYSICAL THERAPY APPROACHES FOR LUMBAR RADICULOPATHY

The search for the relevant review literature was carried referring through many databases: PubMed, PubMed central, ResearchGate and Google scholar and other internet sites.

Data Extraction and Analysis:

4 reviewers independently completed extract and rev-

iew the information extracted were on following study characteristics:

Research aims –

- 1.Introduction
- 2.pathophysiology
- 3.No. of subjects involved
- 4.Result

Table-02

SS No.	Characteritics	Author	Year	Country	No. of subjects involved	Type of research	Conclusion
1.	Effectiveness of low-level laser therapy in patients with discogenic lumbar radiculopathy.	Ahmed I, Bandpei M A, Gilani S A et -al	2022	Pakistan	Out of (n=110) patients (n=55) were divided into each group	RCT	Low level laser therapy is proved as an efficient therapeutic method to conventional physical therapy for patients with discogenic LR.
2.	Effectiveness of therapeutic strategies for patients with radiculopathy ²	Zhang X, Lu J, Wen J et -al ⁶	2018	China	16 studies with 1071 subjects	Meta-analysis	According to the study surgery is recommended as a optimal treatment for LR, along with corticosteroids and traction as a beneficial interventions
3.	A review of lumbar radiculopathy, diagnosis and treatment ⁵	Berry J A, Alia C, Saini H et- al	2019	USA	501 Patients in SPORTS trail are selected.	Literature review	In his study he has found that newer and less invasive techniques are being developed to surgically treat these patients in the involving field of spinal surgeries.
4.	Two manual therapy techniques for management of lumbar radiculopathy ⁶ .	Danazumi S M, Bello B, Yakasai M et- al	2021	Nigeria	60 patients are randomly allocated in 3 groups 20 participants in each group.	RCT	In this study they concluded that the combined results of SMWLM + PINS Treatment protocol showed better improvement than the individual techniques alone.

5	Physiotherapy management of lumbar disc herniation with radiculopathy ⁸ .	Danazumi S. M	20 20	Nigeria	15 studies discussed, with 3 groups.	Narrative review	Based on the level of evidence, the findings of this study are concluded that EOTA, SM and LSEs with combination of LPLT are better than any physiotherapy intervention in the management of LDHR.
6	Effectiveness of mechanical traction on lumbar radiculopathy ⁷	Alice V C Panizolo A, Guccione A A et -al	20 20	Italy	Adults of 18 years old age.	Systematic review	This study stated that for pain and disability in patients with LR there is short term effectiveness of supine mechanical traction when combine with physical therapy interventions
7	Effectiveness of McKenzie method with TENS on lumbar radiculopathy ¹⁰ .	Patel J I, Prem Kumar B N, Ravish V N et- al	20 16	Bangalore	40 patients with 2 groups 20 patients in both groups.	RCT	This study shows that there was a significant reduction of pain, improvement in SLR, lumbar spine ROM, and disability.it is found that experimental group shoed earlier control when compared to control group.
8	Vertical traction for lumbar radiculopathy ¹¹	Vanti, Turone L, Pillastrini P et -al	20 21	Italy	85 Patients (ranges from 16 - 50 years) are included.	Systematic Review	This study concluded that vertical traction may have a positive effect in short term effects along with medication or bed rest.
9	Clinical practice guidelines for person with non-specific low back pain with and without radiculopathy. ¹²	Zaina F, Cote P, Verville L et -al	20 23	Canada	4 high quality CPGs (clinical practice guidelines) are selected.	Systematic Review	In this study they discussed that the evidence-based recommendations from high quality CPGs to
10	Manual therapy in cervical and lumbar radiculopathy ⁸	Kulligowski T, Skrzek A, Cieslik B et- al	20 21	Poland	Out of 473 potentially relevant articles, 21 articles are selected on CR and 6 articles are selected on LR	Systematic Review	Multimodal approach for both CR and LR along with traction and in LR spinal mobilization and activation of core muscles are sowed better results in recovery.no single method therapy is recommender in both CR and LR.
11	Exercise and manual therapy for treatment of LBP with or without lumbosacral radiculopathy. ⁷	Pradhan A, Jothilingam M. et -al	20 21	Chennai	44 articles are selected out of which 15 are included.	Narrative review	Studies reviewed here it can be concluded that lumbar stabilization and strengthening exercises are much beneficial in low back pain. whereas spinal mobilization and neural mobilization is more effective in treatment of lumbosacral radiculopathy apart from spinal exercises

The main emphasis was given systematic and narrative reviews, clinical trials to examine the role of physiotherapeutic interventions in rehabilitation of lumbar radiculopathy.

Discussion

In this article we review various physiotherapeutic approaches for rehabilitation of lumbar radiculopathy which reduces the symptoms including pain, disability, numbness, loss of function, and muscle weakness. These are activity modification, pain management, exercise regimes, manual therapy, electrotherapy and Traction.

1- Musa S. Dunazumi, Abdulsalam M. Yakasai Basir Kaka et-al (2021): Evaluated that a comparative study of two manual therapy techniques i.e. SMWLM (Spinal mobilization with leg movement and PINS (Progressive inhibition of neuromuscular structures) are intervene in patients with lumbar radiculopathy in which a total of 60 patients were allocated into 3 groups 20 participants each in SMWLN + PINS and SMWLN AND pins alone. Each group attended 2 treatments per week for 3 months, participants were assessed at baseline, immediately posttreatment and then three, six and nine months follow ups using the VAS, RMDQ, SBI. It is found that: participants receiving the combined SMWLN + PINS treatment experienced greater improvement in leg pain, back pain, disability and sciatica when compared with taken SMWLN and PINS alone.⁵

2- Xiaoyu Zhang, zhiqiang zhang , Jianzhong Wen et-al(2018): conducted a study to understand the better treatment options available for LR Patients , a total of 16 RCTs were selected according to standard literature selection criteria ,thus they stated that surgery along with traction is highly recommended as a first class treatment ,whereas the different approaches such as steroid injections, traction or different dose of drug combinations will also have impact on efficacy of LR patients ,hence they concluded that the choice of treatment should be based on clinical situation of patient.

3- Anwesh Pradhan, Muthukumaran Jothi lingam et al (2021): discussed that various exercises seems effective in low back pain with or without lumbosacral radiculopathy which includes core stability exercises, motor control exercises, open kinetic McKenzie exercise which plays an effective role in improving the pain intensity, disability, activity and flexibility of low back region and improves endurance.

Whereas manual therapy also shows better results in LR patients specifically two manual therapy techniques i.e. Neural mobilization with Spinal vertebrae mobilization, both the techniques together help in improving pain, functional disability and muscle activation better than conventional treatments.

4- Ishaq Ahmed, Mohd. Ali Mohseni Bandpei, Syed Amir Gilani et al (2022): evaluated the direct impact of LLLT (Low level laser therapy), on acute LR that leads to an onset of neuropathic pain, the use of laser therapy at 840 nm wavelength on injured peripheral nerves significantly improves nerve recovery, LLLT also have impact on the activity of antioxidant enzymes which increases non-specific resistance to cells that

causes damage. Thus, the study concluded that LLLT is proved as an effective adjunct therapy for patients with LR which helps in improving local trunk movements, functional disability and pain intensity as compared to conventional physical therapy alone.

5- Tomasz Kulligowski, Anna Skrzek, Blazej Cieslik (2012): Evaluated that traction-oriented techniques are most frequently used treatment for CR and LR Patients, and are also efficient in reducing pain and improving functional independence, according to the available literature multimodal approach with traction component is most beneficial in CR, similarly for LR the multimodal approach along with traction, spinal mobilization and activation of core muscles are shows better results in LR patients. No single method therapy is recommended for treating both CR and LR.

6- Carla Vanti, Luca Turone, Paola Pillastrini (2021): Evaluated that the use of vertical traction as a treatment option among well-defined population of LR, the included studies show large statistically significant results on pain in favors of VT only when traction is combined with passive treatment (bed rest and medication) and compared with same treatment alone these results show very low quality of evidence. therefore, they concluded that VT appears very limited in LR, since positive results are found only on pain. while medication and bed rest improve the activity limitation and furthers deterioration.

7- Musa Sani Danazumi (2019): Discussed that based on the level of evidence, this study concluded that Extension oriented treatment approach, spinal mobilization in combination with low level laser therapy shows better results in LR as compared to other conventional therapies.

8-Jai Indravadhan Patel, Prem Kumar B N, Dr. Ravish VN (2016): Evaluated that they intervene McKenzie method with TENS in experimental group and group B was treated with general exercises with TENS. thus, the statistical analysis concluded that experimental group has faster rates of reducing symptoms of LR.

9- James A Berry, christopher Elia, Harlneel S Saini et al (2019): Discussed that guidelines for lumbar radiculopathy favors an initial trial of conservative management including patient education, exercise, manual therapy and NSAIDs. When conservative management fails to provide then surgical interventions are considered, overall surgery has been shown to be benefit to the patients with severe pain and related symptoms

10- Carla Vanti, Alice Panizzolo, Andrew A Guccione et al (2020): discussed that they found significant results on pain and disability when adding mechanical traction in supine position to physiotherapy, whereas mechanical traction in prone position with TENS has been proved less beneficial in population of LR.

CONCLUSION.

Lumbar radiculopathy is a complex pain syndrome with altered neuromuscular control in lower extremity unilateral or bilateral both. Majority of patients recovers with conventional methods within 4 to 6 weeks or it may last to 1st, while surgery has been done in many cases.

Physiotherapy has played an important role in management of lumbar radiculopathy in management of pain, neuromuscular control, strengthening and stabilization of spine, increasing flexibility, improving endurance and recovering functional independency.

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