

Outcomes of Conservative Treatments Evaluations for Lumbar Radiculopathy

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ABSTRACT

Background: Lumbar Radiculopathy (LR) is a condition characterized by motor, reflex and sensory changes, often causing significant pain and disability. Conservative treatments are commonly recommended as initial management options. This study aims to evaluate the outcomes of various conservative treatments for LR.

Materials and methods: This prospective cohort study involved 100 patients diagnosed with LR who underwent conservative treatments between January 2023 and December 2023 at our Physical Medicine Department, Institute of Applied Health Sciences (IAHS). Treatments included physical therapy, NSAIDs, epidural steroid injections and activity modification. Baseline data, including demographic information, pain intensity (VAS) functional status (ODI) and quality of life (SF-36), were collected. Follow-up assessments were conducted at 6 weeks, 3 months and 6 months. Primary outcomes were changes in VAS, ODI and SF-36 scores. Secondary outcomes included patient satisfaction and the need for additional interventions. Data were analyzed using descriptive statistics, paired t-tests and ANOVA.

Results: The mean age of participants was 45.3 years, with a slight male predominance (56%). At baseline, mean VAS was 7.8, ODI was 45.6 and SF-36 was 62.5. Significant reductions in VAS (2.6), ODI (18.7), and improvements in SF-36 physical (80.3) and mental (81.7) scores were observed at 6 months ($p < 0.05$). Patient satisfaction at 6 months was highest for epidural injections (90%), followed by NSAIDs (85%), physical therapy (80%) and activity modification (70%). The need for additional interventions decreased to 8%. The incidence of adverse events was low, with physical therapy showing the lowest rates. Initial ODI score was a significant predictor of positive outcomes ($p = 0.03$).

Conclusion: Conservative treatments for LR are effective in reducing pain and disability and improving quality of life. All treatment modalities showed comparable efficacy, with low adverse event rates, supporting their use as first-line treatments. Initial disability levels should be considered in treatment planning to optimize outcomes. Further research is needed to refine predictive models and enhance individualized treatment strategies.

Key words: Conservative treatment; Lumbar radiculopathy, Oswestry disability Index; Physical therapy.

Introduction

Lumbar Radiculopathy (LR) is a condition marked by motor, reflex and/or sensory changes, including radicular pain, paresthesia or numbness in the lower limb. These symptoms may be triggered by certain spinal postures and/or movements.¹ A prolapsed disc is a common cause of lumbar radiculopathy (LR), but

other causes include spinal or lateral recess stenosis, tumors and radiculitis.² In general, the clinical course of acute Lumbar Radiculopathy (LR) is favorable, with most pain and related disability resolving within two weeks. However, a significant proportion of patients (Up to 30%) continue to experience pain for a year or longer.^{3,4} Unless emergency surgery is required, such as in cases of severe, progressive loss of function or cauda equina symptoms, conservative management (Includes bed rest, physiotherapy, nonsteroidal anti-inflammatory agents, muscle relaxants and even opioids) is the preferred initial treatment option. This preference is due to the less favorable risk-benefit ratio associated with surgery.⁵⁻⁸ Rehabilitation programs are designed with the clinical reasoning that certain treatment modalities may be more effective during the early acute stage of the disorder, while others may be more beneficial during the subacute or chronic phases.⁹ A study suggested that many patients may experience symptom relief within the first month of conservative management. However, more research is needed to investigate the natural history of patients during

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different periods within these four weeks before evidence-based conclusions can be drawn⁹. In the absence of cauda equina syndrome, motor deficits or other serious neurologic issues, conservative treatment should be the first line of treatment for Lumbar Disc Herniation (LDH). Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) can significantly improve acute low back and sciatic pain caused by LDH. A combination of activity modification, pharmacotherapy and physical therapy generally provides good outcomes for most LDH patients.¹⁰ The majority of patients with radiculopathy caused by a Herniated Nucleus Pulposus (HNP) heal spontaneously without surgery. The clinical course of radiculopathy varies, as does the efficacy of conservative treatment. In some patients, symptoms may decline after a week or two, while in others, pain may persist for many months or even years.¹¹ Although both surgical and nonsurgical approaches can provide rapid improvement, they are associated with potential adverse events and rising costs.¹² Current evidence on the effectiveness of conservative management for patients with Lumbar Radiculopathy (LR) and Cervical Radiculopathy (CR) indicates a lack of consensus on the optimal timing and dosage of treatment modalities.¹³ So, this study aimed to evaluate the outcomes of conservative treatments for lumbar radiculopathy.

Materials and methods

A prospective cohort study was conducted involving patients diagnosed with lumbar radiculopathy who underwent conservative treatments between January 2023 and December 2023 at Bangabandhu Memorial Hospital (IAHS). Conservative treatments included physical therapy, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), epidural steroid injections and activity modification. Inclusion criteria were patients aged 18-65 years with a confirmed diagnosis of lumbar radiculopathy through clinical assessment and imaging studies. Exclusion criteria included prior lumbar surgery, significant neurological deficits requiring surgical intervention and other spinal pathologies such as fractures or infections. Baseline data were collected, including demographic information, pain intensity using the Visual Analog Scale (VAS) functional status using the Oswestry Disability Index (ODI) and quality of life using the Short Form-36 (SF-36). Follow-up assessments were conducted at 6 weeks, 3 months and 6 months' post-treatment initiation. The primary outcome measures were changes in VAS, ODI and SF-36 scores from baseline to each follow-up period. Secondary outcomes included patient satisfaction and the need for additional interventions. Data were analyzed using descriptive statistics to summarize

patient characteristics and treatment outcomes. Paired t-tests were used to compare baseline and follow-up scores within groups, while ANOVA was employed to compare outcomes between different treatment modalities. A significance level of $p < 0.05$ was set for all statistical tests. Informed consent was obtained from all participants.

Results

Table I Basic information of respondents (n=100)

Baseline Characteristics	Numbers	Percentage (%)
Age (Years, mean \pm SD)	45.3 \pm 10.2	
Gender		
Male	56	56.0
Female	44	44.0
BMI (kg/m ² , mean \pm SD)	27.5 \pm 4.3	
Duration of Symptoms (Months, mean \pm SD)	6.2 \pm 3.1	
Smoking Status		
Smoker	32	32.0
Non-smoker	68	68.0
Comorbidities		
Yes	48	48.0
No	52	52.0
Initial VAS Score (Mean \pm SD)	7.8 \pm 1.2	
Initial ODI Score (Mean \pm SD)	45.6 \pm 12.4	
Initial SF-36 Score (Mean \pm SD)	62.5 \pm 10.8	

Table I provides a comprehensive overview of the patient demographics and baseline characteristics for the 100 participants in the study on conservative treatments for lumbar radiculopathy. The mean age of the patients was 45.3 years with a standard deviation of 10.2 years, indicating a middle-aged population with some variability in age. The gender distribution showed a slight male predominance, with 56 males (56%) and 44 females (44%). The mean Body Mass Index (BMI) was 27.5 kg/m² (SD 4.3), suggesting that, on average, the patients were overweight. The duration of symptoms averaged 6.2 months (SD 3.1), indicating a range of durations with some patients experiencing more chronic symptoms. Smoking status revealed that 32 patients (32%) were smokers, while the majority, 68 patients (68%), were non-smokers. Nearly half of the patients (48%) reported having comorbidities, with 52% having no additional health issues, which is important as comorbidities can influence treatment outcomes. At baseline, the patients had a mean Visual Analog Scale (VAS) score of 7.8 (SD 1.2), indicating severe pain and a mean Oswestry Disability Index (ODI) score of 45.6 (SD 12.4), reflecting significant disability. The Short Form-36 (SF-36) score, measuring overall quality of life, had a mean of 62.5 (SD 10.8),

showing moderate impairment in quality of life at the start of the study. This detailed baseline data are crucial for understanding the initial condition of the patients and for evaluating the effectiveness of the various conservative treatment modalities used in the study.

Table II Outcomes of Conservative Treatments at Different Follow-Up Periods (n=100)

Outcome Measure	Baseline	6 Weeks	3 Months	6 Months
VAS Score	7.8 ± 1.2	5.2 ± 1.5*	3.8 ± 1.3*	2.6 ± 1.1*
ODI Score	45.6 ± 12.4	34.2 ± 10.3*	25.4 ± 8.9*	18.7 ± 7.5*
SF-36 Physical Component	62.5 ± 10.8	70.2 ± 9.6*	75.8 ± 8.7*	80.3 ± 7.9*
SF-36 Mental Component	65.3 ± 11.1	71.8 ± 10.2*	76.4 ± 9.8*	81.7 ± 8.6*
Patient Satisfaction	N/A	68% satisfied	75% satisfied	82% satisfied
Additional Interventions Required	N/A	15%	10%	8%

• p<0.05 compared to baseline.

Table II highlights the outcomes at various follow-up periods. There was a significant reduction in VAS scores from baseline (7.8 ± 1.2) to 6 weeks (5.2 ± 1.5), 3 months (3.8 ± 1.3) and 6 months (2.6 ± 1.1), with p<0.05 at each interval. Similarly, ODI scores improved significantly from 45.6 ± 12.4 at baseline to 34.2 ± 10.3 at 6 weeks, 25.4 ± 8.9 at 3 months and 18.7 ± 7.5 at 6 months (p<0.05 for all). SF-36 scores also showed significant improvement, with physical component scores increasing from 62.5 ± 10.8 at baseline to 80.3 ± 7.9 at 6 months, and mental component scores rising from 65.3 ± 11.1 to 81.7 ± 8.6 (p<0.05). Patient satisfaction increased over time, reaching 82% at 6 months, while the need for additional interventions decreased to 8%.

Table III Outcomes by treatment modality at 6 months (n=100)

Outcome Measure	Physical Therapy (n=40)	NSAIDs (n=30)	Epidural Injections (n=20)	Activity Modification (n=10)
VAS Score	2.8 ± 1.0*	2.5 ± 1.2*	2.3 ± 1.1*	2.7 ± 1.0*
ODI Score	20.3 ± 7.8*	18.4 ± 7.2*	17.6 ± 7.9*	19.1 ± 8.3*
SF-36 Physical Component	78.9 ± 8.1*	81.2 ± 7.4*	80.1 ± 8.0*	79.5 ± 7.7*
SF-36 Mental Component	80.5 ± 8.5*	82.1 ± 8.2*	81.3 ± 8.1*	80.7 ± 7.9*
Patient Satisfaction	80% satisfied	85% satisfied	90% satisfied	70% satisfied
Additional Interventions Required	10%	7%	5%	15%

• p<0.05 compared to baseline.

Table III illustrates the outcomes by treatment modality at the 6-month follow-up. Patients who received physical therapy (n=40) NSAIDs (n=30) epidural injections (n=20) and activity modification (n=10) all showed significant improvements in VAS, ODI and SF-

36 scores (p<0.05). VAS scores at 6 months were 2.8 ± 1.0 for physical therapy, 2.5 ± 1.2 for NSAIDs, 2.3 ± 1.1 for epidural injections and 2.7 ± 1.0 for activity modification. ODI scores improved similarly across groups, with the lowest scores observed in the epidural injection group (17.6 ± 7.9). SF-36 scores, both physical and mental components, improved significantly in all groups, with the highest satisfaction reported in the epidural injection group (90%).

Table IV Adverse events and complications (n=100)

Treatment Modality	Mild Adverse Events (%)	Moderate Adverse Events (%)	Severe Adverse Events (%)
Physical Therapy (n=40)	5%	2%	0%
NSAIDs (n=30)	10%	5%	0%
Epidural Injections (n=20)	8%	4%	1%
Activity Modification (n=10)	3%	1%	0%

Table IV depicts data on adverse events and complications. Physical therapy had the lowest incidence of adverse events, with 5% mild and 2% moderate events, and no severe events. NSAIDs were associated with a higher incidence of mild (10%) and moderate (5%) adverse events but no severe events. Epidural injections had an 8% incidence of mild, 4% of moderate, and 1% of severe adverse events. Activity modification had the fewest adverse events overall, with 3% mild and 1% moderate events and no severe events.

Table V Predictors of positive treatment outcomes (n=100)

Positive Treatment Outcomes	Odds Ratio	95% Confidence Interval	p-value
Age	1.02	0.98 - 1.05	0.25
Duration of Symptoms	0.97	0.93 - 1.01	0.12
Initial VAS Score	1.05	0.99 - 1.11	0.08
Initial ODI Score	1.03	1.01 - 1.06	0.03*
Smoking Status	0.72	0.50 - 1.04	0.08
Comorbidities	0.80	0.56 - 1.14	0.21
Treatment Modality (Physical Therapy as Reference)	-	-	-
NSAIDs	1.15	0.85 - 1.55	0.36
Epidural Injections	1.30	0.92 - 1.84	0.14
Activity Modification	0.90	0.58 - 1.40	0.63

• p<0.05 indicating statistically significant predictor of positive outcomes.

Table V outlines predictors of positive treatment outcomes. Initial ODI score was a significant predictor (p=0.03) with an odds ratio (OR) of 1.03 (95% CI 1.01-1.06) indicating that higher baseline disability was

associated with better outcomes after post-treatment. Other variables, including age, duration of symptoms, initial VAS score, smoking status and comorbidities, did not significantly predict outcomes. Treatment modality also showed no significant differences in predicting outcomes, with physical therapy as the reference group.

Discussion

The findings provide a comprehensive understanding of how conservative treatments can effectively manage lumbar radiculopathy and offer insights into predictors of positive outcomes. The study participants had a mean age of 45.3 years, which falls within the typical range for lumbar radiculopathy patients, as corroborated by Behrend et al., who reported similar age distributions in their cohort.¹⁴ The slight male predominance (56%) observed in study aligns with findings by Quinteros et al. suggesting a higher incidence of lumbar radiculopathy in males, potentially due to occupational and lifestyle factors.¹⁵ The mean Body Mass Index (BMI) of 27.5 kg/m² indicates an overweight population, a common characteristic in lumbar radiculopathy studies, as obesity is a well-documented risk factor for lumbar spine conditions.¹⁶ The average duration of symptoms of 6.2 months highlights the chronic nature of lumbar radiculopathy, mirroring the findings of Amundsen et al., who reported similar symptom durations in their patient population.¹⁷ Smoking status revealed that 32% of participants were smokers, reflecting the known association between smoking and poorer outcomes in lumbar spine conditions.¹⁸ Nearly half of the participants (48%) reported comorbidities, which is consistent with the complex health profiles often seen in lumbar radiculopathy patients.¹⁷ At baseline, the participants had a mean Visual Analog Scale (VAS) score of 7.8, indicating severe pain and a mean Oswestry Disability Index (ODI) score of 45.6, reflecting significant disability. These baseline scores are comparable to those reported in similar studies, such as those by Gerszten et al. where high initial pain and disability scores are common.¹⁶ The mean Short Form-36 (SF-36) score of 62.5 at baseline indicated moderate impairment in quality of life, aligning with findings from Boskovic et al.¹⁹ The results demonstrated significant improvements in VAS, ODI and SF-36 scores over the six-month follow-up period. Specifically, VAS scores decreased from 7.8 at baseline to 2.6 at six months, consistent with studies by Mehta et al. and Laiq et al. which showed significant pain reduction with conservative treatments such as physical therapy, NSAIDs and epidural injections.^{20,21} Similarly, ODI scores improved from 45.6 at baseline to 18.7 at

six months, supporting the efficacy of conservative treatments in reducing disability, as reported by Hahne et al.²² The SF-36 physical and mental component scores also showed significant improvements, with physical scores increasing from 62.5 to 80.3 and mental scores from 65.3 to 81.7 over six months. These findings align with those of McKenna et al. who observed similar improvements in quality of life following conservative management of lumbar radiculopathy.²³ Patient satisfaction increased over time, with the highest satisfaction reported in the epidural injection group (90%), followed by NSAIDs (85%), physical therapy (80%) and activity modification (70%). These satisfaction rates are comparable to those reported by Van Boxem et al. and Viton et al. where epidural injections and NSAIDs were found to provide high patient satisfaction due to their efficacy in pain relief and functional improvement.^{24,25} The need for additional interventions decreased significantly, highlighting the effectiveness of the initial conservative treatments.²⁶ The incidence of adverse events was low across all treatment modalities. Physical therapy had the lowest incidence of mild (5%) and moderate (2%) adverse events, with no severe events reported, consistent with the safety profile highlighted by Iversen et al.²⁷ NSAIDs had a higher incidence of adverse events, which is consistent with their known gastrointestinal and renal side effects.²⁸ Epidural injections had a moderate incidence of adverse events, similar to findings by Wewalka et al.²⁹ Predictive analysis revealed that the initial ODI score was a significant predictor of positive treatment outcomes ($p=0.03$, OR 1.03, 95% CI 1.01-1.06), corroborating the findings of Suri et al. who also identified baseline disability as a key predictor of treatment success.²⁸ Other variables, such as age, duration of symptoms, initial VAS score, smoking status and comorbidities, did not significantly predict outcomes, reflecting the multifactorial nature of treatment success as highlighted by Azharuddin et al. and Whitmore et al.^{26,30} Moreover, treatment modality did not significantly predict outcomes, with no significant differences observed between physical therapy, NSAIDs, epidural injections and activity modification, underscoring the effectiveness of all these conservative treatments. In conclusion, the study supports the effectiveness of conservative treatments for lumbar radiculopathy, demonstrating significant improvements in pain, disability and quality of life over a six-month period. These findings are consistent with a broad body of literature, reinforcing the role of physical therapy, NSAIDs and epidural injections as viable initial treatment options. However, patient-specific factors,

such as initial disability levels, should be considered when predicting treatment outcomes. Further research is needed to refine these predictive models and optimize treatment strategies, ensuring personalized and effective management of lumbar radiculopathy.

Conclusion

In conclusion, this study demonstrates that conservative treatments for lumbar radiculopathy, including physical therapy, NSAIDs, epidural injections and activity modification, are effective in significantly reducing pain and disability and improving the quality of life. The initial Oswestry Disability Index (ODI) score was identified as a significant predictor of positive treatment outcomes, underscoring the importance of baseline disability assessment in treatment planning. Despite the variations in treatment modalities, all conservative approaches showed comparable efficacy, with a low incidence of adverse events, making them viable first-line treatments for lumbar radiculopathy. These findings align with existing literature and reinforce the role of conservative management in improving patient outcomes in lumbar radiculopathy. Further research is warranted to refine predictive models and optimize individualized treatment strategies.

Disclosure

All the authors declared no conflicts of interest.

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