

EVALUATING THE EFFICACY OF NON-SURGICAL TREATMENT METHODS FOR LUMBAR DISC HERNIATION: A LONGITUDINAL COHORT STUDY

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Abstract

Background: Lumbar disc herniation is a prevalent condition causing significant pain and disability. This study aims to evaluate the efficacy of non-surgical treatment methods in managing lumbar disc herniation. **Materials and Methods:** A longitudinal cohort study was conducted with 100 patients diagnosed with lumbar disc herniation. Non-surgical treatments, including physical therapy, medication management, and lifestyle modifications, were administered. Data was collected at baseline, 3, 6, and 12 months, encompassing pain reduction, functionality improvement, medication use, quality of life, recurrence rate, adverse events, work-related outcomes, and physical activity levels. **Result:** Significant pain reduction was observed, with the mean pain score decreasing from 7.5 at baseline to 3.0 at 12 months. Functionality, as measured by the Oswestry Disability Index, improved from severe disability (60%) at baseline to minimal disability (20%) by 12 months. Medication reliance decreased, with a 40% reduction in opioid use and a 50% reduction in NSAID use. Psychological wellbeing improved by 65%, and sleep quality improved in 60% of participants. The study noted a 20% recurrence rate. Adverse events were minimal, and treatment satisfaction was high (75%). Work-related outcomes were positive, with 60% returning to original work and healthcare visits related to back pain reduced by 40%. Physical activity levels increased, with 70% of participants reporting an increase, and 30% achieving recommended levels. **Conclusion:** Non-surgical treatments were effective in reducing pain, improving functionality, and enhancing quality of life in patients with lumbar disc herniation. The treatments also led to reduced medication use and healthcare visits, underscoring their potential as a viable first-line management strategy. However, the recurrence rate highlights the need for ongoing management and patient-specific treatment adjustments.

INTRODUCTION

Lumbar disc herniation (LDH) is a significant health concern worldwide, impacting a broad demographic and often leading to chronic pain and disability.^[1] The lumbar spine, being a complex structure of intervertebral discs, nerves, muscles, and ligaments, plays a critical role in supporting upper body weight and allowing a range of movements.^[2] However, its functionality can be compromised by disc herniation, where the disc's nucleus pushes through the annulus, often impinging on the spinal nerves.^[3]

This condition is not only a common cause of lower back pain but also often results in sciatica, characterized by pain radiating down the leg, numbness, and weakness.

The prevalence of LDH is a reflection of various risk factors, including aging, degenerative changes, occupational hazards, and lifestyle factors such as physical inactivity and obesity.^[4] These risk factors contribute to the deterioration of disc integrity and increase the susceptibility to herniation. The resulting pain and disability can lead to significant reductions in quality of life and are associated with

substantial economic implications due to healthcare costs and lost productivity.^[5]

Traditionally, the management of LDH has revolved around surgical interventions, especially in cases where conservative treatments fail or neurological deficits are present. While surgery, particularly lumbar discectomy, has been effective in rapidly alleviating symptoms in severe cases, it carries risks such as infection, nerve damage, and the possibility of recurrence.^[6] Moreover, surgery may not always be a feasible option for all patients due to medical comorbidities or patient preference.

In recent years, there has been a growing emphasis on non-surgical treatment modalities for LDH. These include physical therapy, which aims to reduce pain and improve function through exercises and manual therapy; pharmacological management, primarily using pain relievers and anti-inflammatory drugs; and lifestyle modifications, such as weight management and ergonomic adjustments.^[7] Physical therapy, in particular, has been gaining attention for its role in strengthening back muscles, improving posture, and providing long-term benefits. Likewise, the judicious use of medications can manage acute pain episodes effectively while minimizing the risk of long-term opioid use.

However, the scientific literature presents varying results regarding the efficacy of these non-surgical approaches, leading to a lack of consensus on their role as a primary treatment modality. Additionally, there is limited understanding of the long-term outcomes of these treatments in terms of pain reduction, functionality, recurrence rates, and overall quality of life.

Understanding the effectiveness of non-surgical treatments is crucial, given the potential benefits of avoiding surgery and its associated risks. Furthermore, considering the economic burden of LDH, effective non-surgical interventions could provide significant cost savings by reducing the need for more expensive surgical procedures and minimizing the indirect costs associated with disability and lost work productivity.

Aim and Objectives

The primary aim of this study is to evaluate the efficacy of non-surgical treatment methods in managing lumbar disc herniation over a 12-month period. The objectives of the study include:

Assessing the degree of pain reduction achieved through non-surgical treatments.

Evaluating improvements in functionality and mobility among patients.

Determining the extent of reduction in medication use, especially opioids and NSAIDs.

Investigating changes in quality of life parameters, including psychological wellbeing and sleep quality.

Analysing the recurrence rate of symptoms post-treatment.

Assessing patient satisfaction with non-surgical treatments.

Examining work-related outcomes and the impact on healthcare utilization.

Evaluating changes in physical activity levels of the participants.

MATERIALS AND METHODS

Study Design and Setting: This longitudinal cohort study was conducted at Government Medical College, Srikakulam, Andhra Pradesh, India, from June 2022 to May 2023. It aimed to evaluate the outcomes of non-surgical treatment methods in patients with lumbar disc herniation.

Participant Recruitment and Selection Criteria: Participants were selected from the outpatient department of Government Medical College, Srikakulam. The study included adults aged 18-65 with a clinical and radiological diagnosis of lumbar disc herniation. Exclusion criteria encompassed patients with prior spinal surgery, severe comorbid conditions (such as malignancy or systemic infection), pregnancy, and those unable to adhere to the treatment protocol or attend follow-up sessions.

Sample Size Consideration: The sample size of 100 participants was determined based on lumbar disc herniation's estimated prevalence in the outpatient setting, anticipated dropout rate, and the required statistical power to detect clinically significant changes in the primary outcome measures.

Interventions

The study's non-surgical interventions included: Physical Therapy: Customized exercises for lumbar strengthening, flexibility improvement, and education on body mechanics.

Medication Management: Tailored use of pain relievers (like acetaminophen) and anti-inflammatory drugs (such as NSAIDs), based on individual pain levels and physician recommendations.

Lifestyle Modifications: Guidance on weight management, ergonomic advice for daily activities, and back care education.

Data Collection and Follow-Up: Data was gathered at baseline, 3 months, 6 months, and 12 months. This included pain scores (0-10 numerical pain rating scale), functionality (Oswestry Disability Index), medication usage, quality of life (standardized questionnaires for psychological wellbeing and sleep quality), and physical activity levels. Information on symptom recurrence, adverse events, treatment satisfaction, work-related outcomes, and healthcare utilization was also collected.

Statistical Analysis: Data analysis employed appropriate statistical software. Continuous variables were presented as means and standard deviations, while categorical variables were expressed in percentages. The treatment's effectiveness was analyzed using repeated measures ANOVA or similar non-parametric tests, considering a p-value of <0.05 as statistically significant.

Ethical Considerations: Ethical approval was obtained from the Institutional Ethics Committee of Government Medical College, Srikakulam, Andhra Pradesh, India. All participants gave written informed consent, aligning with the Declaration of Helsinki's ethical guidelines.

RESULTS

Pain Reduction and Functionality Improvement

Our study observed a significant reduction in pain over the 12-month period. The mean pain score decreased from 7.5 at baseline to 3.0 at 12 months. A substantial reduction in pain was reported by 85% of participants at 3 months, slightly decreasing to 75% at 6 months, before stabilizing back to 85% at 12 months. These findings indicate the effectiveness of the non-surgical treatments in managing pain associated with lumbar disc herniation.

Furthermore, functionality, as measured by the Oswestry Disability Index, showed marked improvement. Scores improved from 60% (indicating severe disability) at baseline to 20% (indicating minimal disability) by the end of the study. This improvement was progressive over the 12 months, correlating with the reduction in pain scores [Table 1].

Medication Reduction and Quality of Life Improvements

A gradual decrease in medication reliance was noted, with a 40% reduction in opioid use and a 50% reduction in NSAID use by the 12-month mark. Additionally, measures of psychological wellbeing showed a 65% improvement, and sleep

quality improved in 60% of participants by the end of the study. These findings highlight the broader impact of the treatment on patients' quality of life, extending beyond physical symptom management [Table 2].

Recurrence Rate, Adverse Events, and Treatment Satisfaction

The study noted a 20% recurrence rate of symptoms, primarily between the 6- and 12-month marks. However, 50% of those experiencing recurrence managed their symptoms with minimal intervention. Adverse events were minimal, with 10% reporting muscle soreness and fatigue related to physical therapy, and 5% reporting gastrointestinal side effects from NSAID use. Notably, 75% of participants reported high satisfaction with the treatment [Table 3].

Work-Related Outcomes and Healthcare Utilization

Work-related outcomes were positive, with 60% of the employed participants returning to their original work, though 25% required modifications to their work duties or hours. There was a notable 40% reduction in healthcare visits related to back pain, and hospitalization due to back pain was reported in only 2% of the participants during the study period [Table 4].

Physical Activity Levels

The study also found an increase in physical activity levels, with 70% of participants reporting an increase and 30% achieving the recommended levels of physical activity for adults by the study's conclusion [Table 5].

Table 1: Pain Reduction and Functionality Improvement

Time Point	Pain Reduction (%)	Pain Score (0-10)	Functionality Improvement (%)	Functionality Score (%)
Baseline	-	7.5	-	60 (Severe Disability)
3 Months	85	6.0	50	40 (Moderate Disability)
6 Months	75	4.5	70	30 (Moderate Disability)
12 Months	85	3.0	80	20 (Minimal Disability)

Table 2: Medication Reduction and Quality of Life Improvements

Outcome	Baseline	3 Months	6 Months	12 Months
Opioid Use Reduction (%)	-	20	30	40
NSAID Use Reduction (%)	-	25	35	50
Psychological Wellbeing Improvement (%)	-	30	50	65
Sleep Quality Improvement (%)	-	35	50	60

Table 3: Recurrence Rate, Adverse Events, and Treatment Satisfaction

Outcome	Percentage (%)
Recurrence Rate	20
Managed with Minimal Intervention	50
Muscle Soreness and Fatigue	10
Gastrointestinal Side Effects	5
Treatment Satisfaction	75

Table 4: Work-Related Outcomes and Healthcare Utilization

Outcome	Percentage (%)
Return to Original Work	60
Required Work Duty Modifications	25
Reduction in Healthcare Visits	40

Table 5: Physical Activity Levels

Outcome	Percentage (%)
Increase in Physical Activity Levels	70
Achieved Recommended Activity Levels	30

DISCUSSION

This study's exploration into the effectiveness of non-surgical treatments for lumbar disc herniation offers valuable insights, resonating with and expanding upon the findings of previous research in this field. Our study's results align with the growing body of evidence supporting the efficacy of non-surgical interventions in managing this condition.

Efficacy of Non-Surgical Treatments

Consistent with the findings of Arts et al. (2019),^[12] and Choi et al. (2022),^[17] our study observed significant reductions in pain scores and improvements in functionality among participants. This aligns with the growing consensus on the benefits of physical therapy and medication management in lumbar disc conditions, as highlighted in the comprehensive reviews by Khorami et al.^[8] (2021) and Awadalla et al. (2023).^[13] The observed fluctuation in pain reduction at the 6-month mark, followed by an improvement at 12 months, suggests the potential for ongoing or adjusted treatment plans, a notion also discussed by Benzakour T and Benzakour A (2019).^[16]

Functionality Improvements

The substantial improvements in functionality, as reflected in our findings and measured by the Oswestry Disability Index, are crucial as they directly impact the patient's quality of life and daily activity capabilities. This observation echoes the results presented by Oliveira et al. (2020),^[15] and Carlson and Albert (2019).^[11]

Medication Reduction

Our study's noted reduction in medication use, particularly opioids and NSAIDs, is a pivotal finding. It mirrors concerns about long-term opioid use and NSAID-related complications, highlighted in the literature by Malik et al. (2023).^[10] The reduction may reflect the effectiveness of non-pharmacological interventions in managing pain, as suggested in the systematic review by Wang et al. (2020).^[14]

Quality of Life

Enhancements in psychological wellbeing and sleep quality, as noted in our study, underline the holistic impact of non-surgical treatments. These improvements are often overlooked in physical health conditions but are essential for overall patient wellbeing, a concept also supported by Aljallad et al. (2023).^[9]

Recurrence Rate and Adverse Events

The 20% recurrence rate observed in our study underscores the need for ongoing management strategies and potentially individualized treatment

plans. This finding is consistent with the broader treatment outcomes discussions in the field, as seen in studies like Kim et al. (2021).^[12] Moreover, the relatively low incidence of adverse events and high treatment satisfaction rates in our study align with the evidence suggesting that non-surgical interventions can be both effective and safe, as proposed by Benzakour T and Benzakour A (2019).^[16]

Work-Related Outcomes and Healthcare Utilization

The positive work-related outcomes and reduced healthcare utilization observed in our study highlight the potential economic benefits of non-surgical treatments. This finding is crucial, considering the economic implications of lumbar disc herniation management, as discussed by Awadalla et al. (2023).^[13]

Physical Activity Levels

The increase in physical activity levels noted in our study is encouraging. Physical activity plays a critical role in overall health and wellbeing, a concept echoed in the research by Wang et al. (2020).^[14]

Limitations and Future Research

While our study provides significant insights, it has limitations, including the sample size and single-center design, which may affect the generalizability of the findings. Future research should focus on larger, multicenter studies to validate these results, as suggested by Oliveira et al. (2020).^[15] Moreover, long-term follow-up beyond one year would be beneficial to understand the sustainability of these treatment outcomes, a consideration also highlighted by Carlson and Albert (2019).^[11]

CONCLUSION

Our study provides substantial evidence supporting the effectiveness of non-surgical treatments in managing lumbar disc herniation. These treatments not only offer pain relief and functional improvements but also contribute to enhanced quality of life, reduced medication use, and favourable economic outcomes. However, the presence of a recurrence rate suggests the necessity for ongoing management and patient-specific treatment adjustments. The findings from this study add valuable knowledge to the field of non-surgical management of lumbar disc herniation and underscore the importance of a holistic, patient-centered approach in treating this condition.

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