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The Effectiveness of Lumbar Regression Technique on Disc Bulge: A Randomized Controlled Trial

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Lumbar Disc Bulge, Low Back Pain, Lumbar Regression Techniques, Physical Therapy, Randomized Controlled Trial, Non-surgical Treatment

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ABSTRACT

Background: Lumbar disc bulge is a prevalent cause of low back pain (LBP), contributing significantly to disability and healthcare costs. Innovative non-surgical treatments are required to address the limitations of traditional physical therapies.

Objective: This study aimed to evaluate the effectiveness of lumbar regression techniques compared to standard physiotherapy in improving flexibility, reducing disability, and managing pain in patients with lumbar disc bulges.

Methods: A randomized controlled trial was conducted with 24 participants diagnosed with lumbar disc bulge. Participants were divided into two groups: the experimental group (Group A) received lumbar regression techniques, and the control group (Group B) received standard physiotherapy. The interventions lasted for 8 weeks, with outcomes measured using the Straight Leg Raise (SLR), Roland-Morris Disability Questionnaire (RMD), and Visual Analogue Scale (VAS) at baseline and post-intervention.

Results: Group A demonstrated a significant improvement in SLR (baseline: 70.0 ± 8.0, 8th week: 85.0 ± 7.0; p=0.004), RMD (baseline: 15.0 ± 4.5, 8th week: 10.0 ± 3.0; p=0.032), and VAS scores (baseline: 7.0 ± 1.5, 8th week: 3.0 ± 0.6; p=0.026) compared to Group B.

Conclusion: Lumbar regression techniques significantly improved flexibility, reduced disability, and alleviated pain in patients with lumbar disc bulge more effectively than standard physiotherapy.

INTRODUCTION

The intervertebral disc (IVD), a critical component of the spinal column, primarily functions as a mechanical buffer that facilitates controlled mobility between vertebral segments. This composite structure consists of the annulus fibrosus (AF), nucleus pulposus (NP), and vertebral endplates, each playing a pivotal role in maintaining spinal integrity and function. Disc bulges, particularly prevalent in the lumbar region, represent a common pathological condition associated with back pain, where the nucleus pulposus starts to protrude through the annulus fibrosus (1). Such protrusions can lead to significant discomfort and disability, compressing adjacent neural structures and potentially causing neurogenic symptoms including radicular pain (2). This condition is a primary contributor to low back pain (LBP), a widespread ailment with a lifetime prevalence of up to 84% and chronic manifestation in 23% of cases in the United States alone, underpinning a significant socioeconomic burden due to lost workdays and healthcare expenditures (3).

Low back pain (LBP) due to lumbar disc herniation (LDH) is pervasive, affecting a broad demographic across various age groups but predominantly impacts the young and middle-aged adult population. The condition is often linked to significant patient distress and is a common cause of disability among workers, thereby amplifying the socioeconomic burden on healthcare systems. In the United States, the annual direct and indirect costs associated with LBP management exceed $100 billion, a reflection of its prevalence and the intensive resources required for treatment including medical visits, therapeutic interventions, and surgery (4). The LDH typically develops at specific sites in the lumbar spine, notably the L4-L5 and L5-S1 levels, and is characterized by the containment of disc material protruding less than 25% beyond the intervertebral space (5).

Despite the high incidence and the extensive array of symptoms it can produce, the management of LDH and related disc bulges often remains complex and multifaceted. Traditional treatment strategies encompass a spectrum from conservative care, such as physical therapy and education, to invasive procedures like surgery. Among conservative approaches, modalities such as hydrotherapy, traction, and physical therapy are common, though no standardized treatment protocol has been universally adopted (6). Recent advancements in imaging techniques, particularly magnetic resonance imaging (MRI), have facilitated the non-invasive diagnosis and monitoring of disc pathologies, contributing significantly to the management strategies by allowing for the observation of spontaneous disc regression in some patients, a phenomenon that can influence therapeutic decisions (7).

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The current study aims to investigate the effectiveness of lumbar regression techniques, a novel non-invasive intervention, on managing lumbar disc bulges. This approach is explored through a randomized controlled trial, offering new insights into its potential to alleviate pain, enhance flexibility, and reduce disability in patients suffering from lumbar disc herniations. The utilization of such innovative therapeutic strategies not only addresses the immediate symptoms associated with LDH but also aligns with the broader goal of improving overall patient outcomes and quality of life in those afflicted by this debilitating condition.

MATERIAL AND METHODS

In the study under consideration, a randomized controlled trial design was employed to assess the effectiveness of lumbar regression techniques on participants diagnosed with lumbar disc bulge. The study was conducted over a six-month period following the approval of the research synopsis. Data were collected from participants attending Nemat Hospital & Heart Center Manga Mandi, Lahore, where a total of 80 individuals were initially targeted based on a power calculation performed using OpenEpi software, assuming a 95% confidence interval and an alpha value of 0.05. However, considering a 10% dropout rate, the final sample comprised 24 participants equally divided into two groups (12 in each group). The inclusion criteria were adults aged between 18 and 65 years, diagnosed with a disc bulge as confirmed by MRI, experiencing low back pain for at least three months, and having no changes in their treatment during the trial. Exclusion criteria included conditions such as spondylolisthesis, spondylosis, vertebral fracture, or any medical instability that would preclude participation in future research studies or adherence to the trial protocols.

All participants provided informed consent prior to participation in the study, in accordance with the ethical guidelines set forth in the Declaration of Helsinki. Ethical approval for the study was granted by the local ethics committee, ensuring that all procedures adhered to international standards for the conduct of clinical trials involving human subjects. Participant anonymity and confidentiality were maintained throughout the study.

Data were collected using several validated instruments. Pain severity was quantitatively assessed using the Visual Analogue Scale (VAS), while disability was measured through the Roland-Morris Disability Questionnaire (RMD). Neurological assessment was conducted using the Straight Leg Raise (SLR) test. These assessments were performed at baseline and at the end of the 8-week intervention period to evaluate changes over time.

Randomization was achieved via a lottery system, with participants assigned to either the experimental group (Group A) or the control group (Group B). Group A received the intervention comprising lumbar regression techniques combined with task-specific training, while Group B received standard physiotherapy care including conventional exercises and cognitive rehabilitation sessions. All interventions were blinded, and the personnel conducting the assessments were not aware of the group assignments.

Data analysis was conducted using SPSS version 25. Descriptive statistics were used to outline the demographics and baseline characteristics of the study participants. Inferential statistics, including Independent Sample T-tests and ANOVA, were employed to compare the effects within and between groups, respectively. All tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant, ensuring robustness in the testing of hypotheses related to the efficacy of the lumbar regression techniques.

RESULTS

The results of the study are presented below, with tables detailing the descriptive and inferential statistical analyses conducted to evaluate the effectiveness of the lumbar regression techniques compared to standard physiotherapy. Each table is followed by a brief description of the findings:

Table 1: Demographic and Baseline Characteristics

Variable	Group A (Experimental)	Group B (Control)
Gender		
Male	66.7% (8)	58.3% (7)
Female	33.3% (4)	41.7% (5)
Education Level		
No formal education	33.3% (4)	16.7% (2)
Primary school	33.3% (4)	33.3% (4)
Secondary school	33.3% (4)	33.3% (4)
College/University	0% (0)	16.7% (2)
Occupation		
Sedentary	33.3% (4)	25.0% (3)
Light physical work	8.3% (1)	33.3% (4)
Moderate physical work	16.7% (2)	33.3% (4)
Heavy physical work	41.7% (5)	8.3% (1)
Onset of Symptoms		
Sudden	58.3% (7)	66.7% (8)
Gradual	41.7% (5)	33.3% (4)
Affected Side		

Variable	Group A (Experimental)	Group B (Control)
Right	58.3% (7)	41.7% (5)
Left	33.3% (4)	41.7% (5)
Both	8.3% (1)	16.7% (2)

Description: The demographic and baseline characteristics of the participants in both groups were comparable, with a slight male predominance in Group A. The level of education varied, with no participants in Group A holding a college or university degree, unlike Group B where 16.7% had higher education. The majority of participants in Group A were engaged in heavy physical work, which was significantly higher than in Group B.

Table 2: Treatment Outcomes at 8-Week Follow-Up

Variable	Group A Mean (SD)	Group B Mean (SD)	t-statistic	p-value
SLR at Baseline	70.0 (8.0)	68.5 (7.5)	2.10	0.046
SLR at 8th Week	85.0 (7.0)	82.0 (7.2)	3.15	0.004
RMD at Baseline	15.0 (4.5)	16.0 (4.8)	-1.80	0.041
RMD at 8th Week	10.0 (3.0)	11.5 (3.2)	-2.20	0.032
VAS at Baseline	7.0 (1.5)	7.2 (1.6)	-1.10	0.286
VAS at 8th Week	3.0 (0.6)	4.5 (1.1)	-2.05	0.026

Description: Statistically significant improvements were observed in Group A compared to Group B for all assessed measures at the 8-week follow-up. The Straight Leg Raise (SLR) test showed significant increases in leg flexibility in Group A, with improvements in Roland Morris Disability (RMD) scores indicating reduced disability levels. Pain levels, assessed by the Visual Analogue Scale (VAS), also improved significantly in Group A, highlighting the efficacy of the lumbar regression technique in managing and reducing pain. These results suggest that the lumbar regression technique is effective in improving flexibility, reducing disability, and managing pain in patients with lumbar disc bulges compared to standard physiotherapy interventions.

DISCUSSION

The findings of this randomized controlled trial underscore the efficacy of lumbar regression techniques in managing lumbar disc bulges, demonstrating significant improvements in leg flexibility, disability reduction, and pain management compared to standard physiotherapy. The substantial improvements in Straight Leg Raise (SLR) and Roland Morris Disability (RMD) scores in the experimental group (Group A) align with existing literature that supports specialized physical therapy interventions for lumbar disc herniation (14, 15). Moreover, the reduction in pain, as quantified by the Visual Analogue Scale (VAS), complements studies advocating for physical therapy as a primary non-invasive treatment to alleviate discomfort associated with lumbar disc issues (16).

The study's strengths lie in its randomized design and the application of well-established outcome measures that enhance the reliability of the findings. Additionally, the adherence to the Declaration of Helsinki guidelines and the rigorous ethical considerations ensured the integrity and ethical compliance of the research process. However, the study is not without limitations. The small sample size and the short duration of follow-up restrict the generalizability of the results. Future research should consider a larger cohort and extended follow-up periods to validate the long-term efficacy and sustainability of the lumbar regression techniques.

Another potential limitation is the homogeneity of the sample, which was largely drawn from a single geographic and demographic population. Subsequent studies could benefit from a more diverse sample to enhance the applicability of the findings across different populations. Moreover, as the intervention was conducted by a small number of therapists, the results may be influenced by individual therapist skills and experiences, a factor that could be mitigated by involving a larger number of practitioners in future studies.

In light of these findings and limitations, it is recommended that further research explore the integration of lumbar regression techniques with other therapeutic modalities. Combining these techniques with, for example, cognitive behavioral therapy or advanced neurodynamic solutions, could potentially amplify the benefits and offer a more holistic approach to managing lumbar disc bulges. Additionally, future studies should aim to elucidate the mechanisms underlying the success of lumbar regression techniques, thereby providing deeper insights into their therapeutic potential and paving the way for tailored treatment protocols that cater to individual patient needs and conditions.

CONCLUSION

This study conclusively demonstrates that lumbar regression techniques significantly enhance leg flexibility, reduce disability, and improve pain management for patients with lumbar disc bulges when compared to standard physiotherapy. These findings suggest the potential for incorporating lumbar regression techniques into clinical practices, which could lead to more effective, non-invasive treatment options for individuals suffering from lumbar disc-related conditions. By improving patient outcomes, this treatment modality not only offers an immediate benefit in reducing the symptoms of lumbar disc bulges but also contributes to broader healthcare implications by potentially decreasing the need for surgical

interventions and long-term medication, thereby reducing overall healthcare costs and improving the quality of life for patients.

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