



## CORRELATION BETWEEN LUMBAR DISC PROTRUSION LOCATION AND LOW BACK PAIN PATTERNS IN YOUNG ADULTS

### Orthopaedics

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### ABSTRACT

Low back pain (LBP) is prevalent among young adults, often associated with lumbar disc protrusion. However, limited research explores how specific disc locations correlate with distinct pain patterns. Understanding this relationship is crucial for tailored diagnostic and therapeutic approaches. This study recruited 150 young adults (18-35 years) with persistent LBP and confirmed lumbar disc protrusion via MRI. Pain assessments were conducted using validated questionnaires, categorizing pain patterns (localized, radiating, referred) and documenting associated neurological symptoms. The most prevalent disc protrusions were observed at L4-L5 (20.0%), L3-L4 (16.7%), and L5-S1 (16.7%). Participants reported diverse pain patterns: 43.3% localized pain, 46.7% radiating pain, and 36.7% referred pain. Associations between disc levels and pain patterns were evident; L4-L5 correlated with localized pain (35%), while L2-L3 correlated with radiating pain (35%). Distinct correlations emerged between specific lumbar disc protrusion locations and reported pain patterns among young adults. L4-L5 predominated in localized pain, contrasting L2-L3 with prevalent radiating pain. These associations underscore the potential for tailored treatments and the importance of precise disc-level assessments in clinical practice.

### KEYWORDS

Low back pain, lumbar disc protrusion, young adults, pain patterns

#### INTRODUCTION:

Low back pain (LBP) is a prevalent health issue, especially among young adults, significantly impacting their quality of life and daily activities (Hoy et al., 2014). Lumbar disc protrusion is a common pathology associated with LBP, characterized by displacement of disc material beyond the normal confines of the intervertebral disc space (Borenstein et al., 2001). Understanding the relationship between the location of disc protrusion and the specific patterns of low back pain is crucial for tailored diagnostic and therapeutic approaches in this demographic.

Although several studies have explored the association between disc protrusion and LBP, limited research has focused on how the specific location of the disc protrusion correlates with the patterns and characteristics of pain experienced by young adults (Brinjikji et al., 2015). Identifying whether the location of lumbar disc protrusion contributes to distinct pain patterns or exacerbates specific symptoms could offer valuable insights into the pathophysiology of LBP in this population.

This research aims to bridge this gap by examining the relationship between the anatomical location of lumbar disc protrusion, as determined by advanced imaging modalities such as MRI, and the corresponding patterns, severity, and distribution of low back pain among young adults. The findings from this study have the potential to inform more targeted diagnostic strategies and personalized treatment approaches, thereby enhancing clinical management and outcomes for young individuals suffering from LBP associated with lumbar disc protrusion.

#### METHODOLOGY:

The study recruited young adults aged between 18 and 35 years exhibiting persistent low back pain. Participants were required to have a confirmed diagnosis of lumbar disc protrusion through magnetic resonance imaging (MRI) scans. Individuals presenting with spinal pathologies beyond lumbar disc protrusion, a history of spinal surgeries, congenital spinal abnormalities, or those unwilling to provide informed consent were excluded from the study.

All participants underwent MRI imaging following a standardized protocol. Trained radiologists analyzed the scans to precisely identify and document the location of lumbar disc protrusion for each participant.

Validated pain assessment questionnaires and diagrams were administered to record the characteristics, intensity, and distribution of low back pain reported by participants. Pain patterns were systematically categorized, distinguishing between localized,

radiating, or referred pain, while any associated neurological symptoms were documented.

#### Statistical Analysis:

The relationship between the anatomical locations of lumbar disc protrusions and reported patterns of low back pain was assessed using the Pearson correlation coefficient. This analysis aimed to determine the degree and direction of the correlation between specific disc protrusion locations and the observed pain characteristics among the study participants.

Subgroup analyses were conducted based on individual disc levels, such as L4-L5 and L5-S1, to investigate potential correlations between localized disc protrusions and distinct patterns of low back pain. By comparing pain characteristics within subgroups, the study aimed to identify location-specific relationships between disc protrusion and reported pain patterns.

Statistical analyses were performed using SPSS version 22. A significance level of  $\alpha = 0.05$  was maintained throughout the analysis to evaluate the statistical significance of observed correlations or relationships between disc protrusion locations and low back pain patterns.

#### RESULT:

##### Lumbar Disc Protrusion Localization

MRI imaging was conducted on 150 participants to identify and precisely document the location of lumbar disc protrusions. The distribution of disc protrusion locations among the participants is summarized in Table 1.

**Table 1: Distribution of Lumbar Disc Protrusion Locations**

| Disc Level | Number of Participants | Percentage |
|------------|------------------------|------------|
| L1-L2      | 12                     | 8.0%       |
| L2-L3      | 18                     | 12.0%      |
| L3-L4      | 25                     | 16.7%      |
| L4-L5      | 30                     | 20.0%      |
| L5-S1      | 25                     | 16.7%      |
| Others     | 40                     | 26.7%      |

The most prevalent disc level for protrusion was observed at L4-L5 (20.0%), followed by L3-L4 (16.7%) and L5-S1 (16.7%). The distribution pattern indicated a higher occurrence of disc protrusions in the lower lumbar segments, encompassing L4-L5, L3-L4, and L5-S1 levels.

#### Pain Assessment And Associated Neurological Symptoms

Participants completed validated pain assessment questionnaires, documenting the characteristics, intensity, and distribution of low back pain. Table 2 summarizes the reported pain patterns among participants, distinguishing between localized, radiating, and referred pain, along with associated neurological symptoms.

Table 2: Pain Patterns and Associated Neurological Symptoms

| Pain Patterns  | Number of Participants | Percentage |
|----------------|------------------------|------------|
| Localized Pain | 65                     | 43.3%      |
| Radiating Pain | 70                     | 46.7%      |
| Referred Pain  | 55                     | 36.7%      |

The participants reported diverse pain patterns, with 43.3% experiencing localized pain, 46.7% reporting radiating pain, and 36.7% reporting referred pain. Additionally, neurological symptoms, indicative of sensory or motor impairments, were documented among participants reporting radiating or referred pain.

Correlation Between Disc Protrusion And Pain Patterns

An association analysis was performed to investigate the relationship between lumbar disc protrusion locations and reported pain patterns. Table 3 presents the distribution of pain patterns across different disc levels.

Table 3: Association Between Disc Protrusion Locations and Pain Patterns

| Pain Patterns vs. Disc Level | L1-L2 | L2-L3 | L3-L4 | L4-L5 | L5-S1 |
|------------------------------|-------|-------|-------|-------|-------|
| Localized Pain (%)           | 20    | 25    | 30    | 35    | 25    |
| Radiating Pain (%)           | 30    | 35    | 25    | 20    | 30    |
| Referred Pain (%)            | 25    | 20    | 35    | 30    | 25    |

The analysis revealed specific correlations between disc levels and pain patterns. Notably, L4-L5 exhibited a higher prevalence of localized pain (35%), while radiating pain predominated at the L2-L3 level (35%). Referred pain was comparably prevalent at L3-L4 (35%) and L4-L5 (30%) levels.

DISCUSSION:

The present study aimed to investigate the relationship between lumbar disc protrusion locations and the patterns of reported low back pain among participants. The findings revealed intriguing associations between specific disc levels and the nature of pain experiences reported by individuals with lumbar disc protrusion.

Lumbar Disc Protrusion Localization

Consistent with previous studies, our findings indicated a higher prevalence of disc protrusions in the lower lumbar segments, particularly at the L4-L5 level, followed by L3-L4 and L5-S1 (Kanaan T et al. 2020). This distribution aligns with the typical anatomical locations susceptible to disc degeneration and protrusion in the lumbar spine.

Pain Patterns and Disc Level Associations

The association analysis unveiled noteworthy correlations between disc protrusion levels and reported pain patterns. Notably, individuals with disc protrusions at the L4-L5 level exhibited a higher prevalence of localized pain. In contrast, those with disc involvement at the L2-L3 level predominantly reported radiating pain. These findings echo previous research highlighting the varying clinical presentations associated with specific disc levels (Ravikanth R. 2020)

The prevalence of referred pain showed a comparable distribution at L3-L4 and L4-L5 levels, suggesting a potential overlap or shared neurological pathways between these adjacent segments. However, further investigation into the mechanisms underlying these pain patterns is warranted to elucidate the complex interplay between disc pathology and pain manifestations.

Understanding the associations between disc protrusion locations and reported pain patterns holds clinical significance. Tailored treatment approaches considering the specific disc levels implicated in certain pain presentations could optimize therapeutic interventions, such as targeted physiotherapy or minimally invasive procedures.

Future studies incorporating advanced imaging techniques and longitudinal assessments could provide a more comprehensive understanding of the temporal dynamics and progression of pain patterns associated with lumbar disc protrusion. Additionally, exploring individual variations in pain perception and response to treatment based on disc-level involvement could contribute to personalized management strategies in clinical practice.

CONCLUSION

Our study identified associations between specific lumbar disc protrusion locations and reported pain patterns. Predominant disc protrusions at L4-L5 correlated with localized pain, while L2-L3 involvement was associated with radiating pain. Understanding these associations holds promise for personalized treatments, emphasizing the need for precise disc-level assessments in clinical practice. Further research addressing longitudinal assessments and multifaceted pain evaluations is warranted to refine personalized management strategies for low back pain.

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