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Research Article

Prevalence and Radiological Characteristics of Lumbar Disc Herniation in Adults with Low Back Pain: A Retrospective MRI Study at a Mexican General Hospital.

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Abstract

Background: Lumbar disc herniation (LDH) is a common cause of low back pain (LBP) and disability in adults, often requiring advanced imaging for diagnosis. Although magnetic resonance imaging (MRI) is the gold standard for assessing intervertebral disc pathology, few epidemiological studies have described its prevalence in Mexican populations.
Objective: To determine the prevalence and radiological characteristics of lumbar disc herniations in adult patients with LBP undergoing MRI at General Hospital 450, Durango, Mexico, during 2024.
Methods: We conducted a retrospective, observational, cross-sectional study including electronic medical records and MRI reports of adult patients with LBP. Sociodemographic variables and imaging findings were analyzed. Descriptive statistics were applied to estimate prevalence and disc involvement patterns.
Results: A total of 320 patients were included (63.4% women, mean age 51.2 years). Disc herniation was identified in 32.5% of cases, most frequently as protrusions (27.5%) and less commonly as extrusions (5.0%). Single-level involvement predominated (82.7%), with L4–L5 being the most affected segment (37.7%), followed by L5–S1 (27.0%). Disc bulging was present in 57.7% of cases, and advanced degeneration (Pfirrmann grade IV) was the most frequent degenerative change (61.5%). Foraminal stenosis was reported in 38.9%, and nerve root compression in 36.5%. Overweight and obesity were documented in 72.5% of patients.
Conclusion: LDH prevalence among Mexican adults with LBP was 32.5%, with disc protrusion at L4–L5 being the most common presentation. The high frequency of overweight and obesity suggests potential modifiable risk factors. These findings provide epidemiological evidence to optimize diagnostic strategies and preventive measures in similar populations.

Keywords: lumbar disc herniation, low back pain, magnetic resonance imaging, prevalence, degenerative disc disease.

INTRODUCTION

Low back pain (LBP) is one of the most prevalent musculoskeletal disorders worldwide, affecting nearly 80% of the adult population at some point in life and representing a leading cause of disability and work absenteeism (Amin et al., 2017; Sąsiadek & Jacków-Nowicka, 2024). Its socioeconomic burden is substantial, with estimates exceeding 100 billion USD annually in the United States due to healthcare costs and productivity loss (Wu et al., 2020). Among the multiple etiologies of LBP, lumbar disc degeneration and herniation are the most frequent, accounting for a significant proportion of clinical consultations and imaging referrals (Oxland, 2016; Urban & Roberts, 2003).

Lumbar disc herniation (LDH) is characterized by the displacement of disc material beyond the intervertebral space, commonly presenting as protrusion or extrusion. Approximately 95% of LDH cases occur at L4–L5 and L5–S1, the most mechanically stressed segments of the spine (Amin et al., 2017). Clinical manifestations vary widely, ranging from asymptomatic findings to severe radiculopathy and neurological compromise. Importantly, the correlation between imaging findings and clinical symptoms is not always straightforward, as asymptomatic disc changes are frequently reported in imaging studies (Fardon et al., 2014; Farshad-Amacker et al., 2015).

Magnetic resonance imaging (MRI) is currently considered the gold standard for assessing intervertebral disc pathology, as it provides superior detail of disc morphology, neural compression, and associated degenerative changes (Wu

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et al., 2020; Scarcia et al., 2022). However, its high cost and limited availability in many healthcare settings restrict its use as a first-line diagnostic tool. Despite its widespread use in clinical practice, epidemiological data on the prevalence and characteristics of LDH in Latin American populations remain scarce, with only a few studies conducted in Mexico (Osorio-Peralta et al., 2003; Rivera-Nieto, 2021).

Given the increasing demand for imaging studies and the rising prevalence of modifiable risk factors such as obesity and sedentary lifestyles, understanding the prevalence and radiological distribution of LDH in specific populations is essential for optimizing diagnostic strategies and guiding preventive interventions (Zhang et al., 2018; Fabris de Souza et al., 2005). This study aimed to determine the prevalence and MRI characteristics of lumbar disc herniations in adult patients with LBP at a public tertiary care hospital in northern Mexico.

METHODS

Study design and setting

We conducted a retrospective, observational, descriptive, and cross-sectional study at General Hospital 450, Durango, Mexico. The study period covered January to December 2024.

Study population

The study population included adult patients (18–90 years) with a clinical diagnosis of low back pain who underwent lumbar spine MRI. Electronic medical records and radiology reports were reviewed. Inclusion criteria were patients with complete clinical information, lumbar MRI requests, and available radiological reports. Exclusion criteria were patients who underwent MRI with contrast medium, combined imaging of other anatomical regions, or incomplete records.

Data collection

Demographic and clinical variables extracted included age, sex, body mass index (BMI), religion, educational level, and occupation. Imaging variables included presence and type of disc herniation (protrusion, extrusion), disc bulging, number and levels of affected segments, degree of disc degeneration (Pfirrmann classification), vertebral changes (Modic classification), foraminal stenosis, canal stenosis (Schizas classification), and nerve root compression. A convenience sample was obtained from all eligible records during the study period.

Statistical analysis

Descriptive statistics were applied. Categorical variables were expressed as absolute frequencies and percentages, while continuous variables were summarized using mean, standard deviation, median, and range. Prevalence of LDH was calculated as the number of patients with MRI-confirmed herniation divided by the total number of LBP patients undergoing MRI during the study period. Data were analyzed using SPSS version 26.

Ethical considerations

Study protocol was approved by the local ethical committee with register number (CONIDENTIAL). The study followed the Declaration of Helsinki and the Mexican General Health Law on Health Research. As it involved secondary use of retrospective data without patient contact, it was classified as minimal risk research. Patient confidentiality was preserved according to the Federal Law on Protection of Personal Data Held by Private Parties.

RESULTS

A total of 320 patients with low back pain were included, of whom 203 (63.4%) were women and 117 (36.6%) were men. The mean age was 51.2 ± 15.3 years (median 53 years).

Most patients were overweight or obese, with only 26.6% classified as normal BMI. Specifically, 44.7% were overweight and 27.8% presented some degree of obesity. The majority reported Catholic religion (78.1%) and secondary education level (43.8%).

Lumbar disc herniation was identified in 104 patients (32.5%). Of these, 88 (84.6%) were disc protrusions and 16 (15.4%) were extrusions. Bulging discs were observed in 142 patients (57.7%).

Most herniations involved a single lumbar level (82.7%), with two levels affected in 12.4% and three or more levels in 4.9%. The most frequently affected segment was L4–L5 (37.7%), followed by L5–S1 (27.0%) and L3–L4 (9.4%).

Among protrusions, 51.1% were central, 23.9% foraminal, 20.5% subarticular, and 4.5% lateral. Extrusions predominantly presented with migration (87.5%).

Disc degeneration according to the Pfirrmann classification was reported as grade IV in 61.5% of cases, grade III in 33.2%, grade II in 2.9%, and grade V in 2.5%. Vertebral endplate changes (Modic classification) were described in 53 cases: Modic type 2 was the most frequent (69.8%), followed by type 1 (28.3%).

Foraminal stenosis was documented in 123 cases (65.0% mild, 31.7% moderate, 3.3% severe). Spinal canal stenosis was reported in 243 cases, most frequently Schizas A3 (27.6%) and A2 (25.5%). Nerve root compression was present in 36.5% of cases.

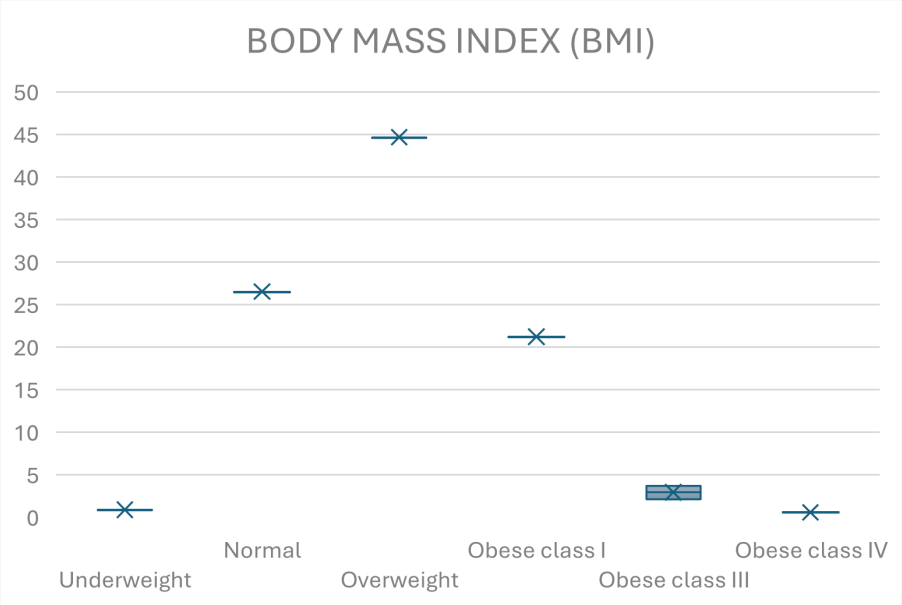
Table 1. Table of percentage of disc herniation where the prevalence of the type of hernia reported in the electronic records was: 88 protrusions (84.62%) and 16 extrusions (15.38%) with a confidence interval shown.

Disc herniation	#	%	CI95%
Protusion	88	84.62	76.22 – 90.94
Extrusion	16	15.38	9.06 – 23.78
TOTAL	104	100	

Table 2. Table of percentage of Pfirmann grading where at least 150 reports classified the degree of degeneration as Pfirrmann IV (61.48%).

Pfirrmann grading System (spine)	#	%	CI95%
Pfirrmann I	0	0	0
Pfirrmann II	7	2.87	1.16 – 5.82
Pfirrmann III	81	33.20	27.32 – 39.49
Pfirrmann IV	150	61.48	55.05 – 67.61
Pfirrmann V	6	2.46	0.91 – 5.28
TOTAL	244	100	

Figure 1. Graphic chart of the Body mass index where the BMI of the study population is represented in percentages and where overweight and obesity prevailed as a risk factor.



DISCUSSION

This study provides epidemiological data on lumbar disc herniation (LDH) in Mexican adults with low back pain (LBP) assessed by MRI. The prevalence of LDH was 32.5%, with disc protrusion as the predominant type (84.6%) and L4–L5 as the most frequently affected level. These findings are consistent with the mechanical vulnerability of the lower lumbar segments and with previous international reports (Oxland, 2016; Wu et al., 2020).

The predominance of female patients and the mean age of 51 years align with prior studies in Latin America, including a thesis from Mexico, where more than half of the cases were women aged 51–60 years (Rivera-Nieto, 2021). However, earlier studies from the Hospital Juárez de México reported a younger mean age and a more balanced sex distribution, suggesting demographic differences across Mexican regions (Osorio-Peralta et al., 2003).

Obesity and overweight were highly prevalent in our population, with more than 70% of patients exceeding normal BMI. Previous meta-analyses have demonstrated an association between obesity and LBP (Zhang et al., 2018), and biomechanical

studies have shown that excess weight increases axial load and accelerates disc degeneration (Fabris de Souza et al., 2005). Although our cross-sectional design does not establish causality, these findings reinforce the role of modifiable lifestyle factors in LDH risk.

Regarding morphological characteristics, the predominance of central protrusions mirrors previous studies (Osorio-Peralta et al., 2003), while the low frequency of extrusions with sequestration suggests that severe herniations may be less frequent in this hospital population. Most herniations were single-level, which agrees with international literature indicating that multi-level LDH is uncommon (Amin et al., 2017).

Degenerative changes were also highly prevalent, with more than 60% classified as Pfirrmann grade IV. Vertebral Modic changes were less frequent but mainly type 2, reflecting chronic degenerative processes. These results are comparable to European and Asian series, highlighting the global similarity of degenerative spine patterns (Farshad-Amacker et al., 2015; Wu et al., 2020; Sąsiadek & Jacków-Nowicka, 2024).

A strength of this study is the systematic review of all MRI reports over one year, using standardized classifications (Fardon et al., 2014). However, limitations must be acknowledged. First, as a retrospective single-center study, findings may not be generalizable to all Mexican populations. Second, discrepancies between radiology and clinical service reports could lead to diagnostic variability. Finally, the lack of clinical follow-up prevented correlation of MRI findings with patient symptoms, which is essential given the known frequency of asymptomatic disc changes (Urban & Roberts, 2003; Amin et al., 2017).

CONCLUSION

In this study, lumbar disc herniation was identified in nearly one-third of adult patients with low back pain undergoing MRI, with disc protrusion at the L4–L5 level as the most frequent finding. Advanced degenerative changes were also highly prevalent, and overweight or obesity was present in the majority of patients, suggesting potential modifiable risk factors. These results highlight the importance of targeted diagnostic strategies and preventive approaches in populations with similar demographic and clinical characteristics.

Disclosure

The authors of this manuscript have no conflicts of interest to disclose.

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REFERENCES

1. Amin RM, Andrade NS, Neuman BJ. Lumbar disc herniation. Curr Rev Musculoskelet Med. 2017;10(4):507-16.
2. Sąsiadek M, Jacków-Nowicka J. Degenerative disease of the spine: How to relate clinical symptoms to radiological findings. Adv Clin Exp Med. 2024;33(1):91-8.
3. Wu PH, Kim HS, Jang IT. Intervertebral disc diseases part 2: A review of the current diagnostic and treatment strategies for intervertebral disc disease. Int J Mol Sci. 2020;21(6):2135.
4. Oxland TR. Fundamental biomechanics of the spine—What we have learned in the past 25 years and future directions. J Biomech. 2016;49(6):817-32.
5. Urban JP, Roberts S. Degeneration of the intervertebral disc. Arthritis Res Ther. 2003;5(3):120.
6. Fardon DF, Williams AL, Dohring EJ, Murtagh FR, Rothman SLG, Sze GK. Lumbar disc nomenclature: version 2.0. Recommendations of the combined task forces of the North American Spine Society, the American Society of Spine Radiology and the American Society of Neuroradiology. Spine J. 2014;14(11):2525-45.
7. Farshad-Amacker NA, Farshad M, Winklehner A, Andreisek G. MR imaging of degenerative disc disease. Eur J Radiol. 2015;84(9):1768-76.
8. Scarcia L, Pileggi M, Camilli A, Romi A, Bartolo A, Giubbolini F, Valente I, Garignano G, D'Argento F, Pedicelli A, Alexandre AM. Degenerative Disc Disease of the Spine: From Anatomy to Pathophysiology and Radiological Appearance, with Morphological and Functional Considerations. J Pers Med. 2022;12(11):1810. doi:10.3390/jpm12111810
9. Osorio-Peralta S, Roldán-Valadez E, Granados-Sandoval E, Sandoval-González C, Casián G. Epidemiological characteristics of lumbar disc herniation by MRI: Initial experience at Hospital Juárez de México. An Radiol Mex. 2003;2(1):17-22.
10. Rivera-Nieto BS. Characterization of lumbar disc herniations by simple MRI at the Regional High Specialty Hospital "Ciudad Salud" in 2019. Universidad Nacional Autónoma de México; 2021.
11. Zhang TT, Liu Z, Liu YL, Zhao JJ, Liu DW, Tian QB. Obesity as a risk factor for low back pain: A meta-analysis. Clin Spine Surg. 2018;31(1):22-7.
12. Fabris de Souza SA, Faintuch J, Valezi AC, Sant'Anna AF, Gama-Rodrigues JJ, de Batista Fonseca IC, et al. Postural changes in morbidly obese patients. Obes Surg. 2005;15(7):1013-7.