

Association Between Functional Status (Oswestry Disability Index) And Body Fat Percentage in Patients Aged 30–45 Years with Low Back Pain

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ABSTRACT

Introduction: Low back pain is one of the leading causes of medical consultation and work-related disability among adults of productive age. The high prevalence of overweight and obesity in Mexico suggests that body fat percentage may play an important role in functional impairment associated with lumbar pain.

Objective: To determine the association between functional status, measured using the Oswestry Disability Index (ODI), and body fat percentage in patients aged 30–45 years with low back pain treated at a secondary care regional hospital.

Materials and Methods: An observational, analytical, prospective, cross-sectional study was conducted. Ninety-six patients aged 30–45 years with a clinical diagnosis of low back pain under conservative treatment were included. Functional status was assessed using the ODI, and body fat percentage was measured by bioelectrical impedance (Omron HBF-514C), categorized as low, normal, high, or very high. Descriptive statistics were used, and the chi-square test assessed associations. Effect size was estimated using Cramer's V. A p-value <0.05 was considered statistically significant.

Results: The sample included 56 women (58%) and 40 men (42%), with a predominance of patients aged 36–40 years (46%). According to ODI, 9% had no disability, 16% mild, 45% moderate, 27% severe, and 3% total disability. Regarding body composition, 5% presented low body fat, 18% normal, 58% high, and 19% very high. Patients with high and very high body fat percentages clustered predominantly in moderate, severe, and total disability categories. A statistically significant association was found between body fat percentage and functional status ($\chi^2=120.48$; $df=12$; $p=0.000$), with a strong effect size (Cramer's $V=0.647$).

Conclusion: A higher body fat percentage is strongly and significantly associated with worse lumbar functional status in adults aged 30–45 years with low back pain. Body fat percentage should be considered a relevant clinical indicator during initial evaluation and in planning conservative treatment, prioritizing fat reduction strategies before considering surgical options.

KEYWORDS: low back pain; Oswestry Disability Index; body fat percentage; functional disability.

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INTRODUCTION

Low back pain is one of the most frequent causes of medical consultation in both primary and specialized care and represents a major contributor to work disability worldwide. Beyond pain and functional limitation at the individual level,

low back pain generates a substantial economic burden due to healthcare costs, absenteeism, and reduced productivity.

In Mexico, approximately 13% of adults aged 20–59 years attending Family Medicine Units of the Mexican Social Security Institute (IMSS) report low back pain, accounting for nearly one-quarter of consultations related to

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musculoskeletal disorders at the primary care level. The condition predominantly affects adults in their most productive years, generally between 30 and 50 years of age, amplifying its social and economic impact.

The Oswestry Disability Index (ODI) is among the most widely used and validated instruments to quantify functional disability related to low back pain. It evaluates limitations in daily activities such as walking, lifting, sitting, sleeping, and social participation, generating a percentage score that allows classification into specific disability levels.

Despite the high prevalence of obesity and overweight in the Mexican population, limited institutional data are available linking functional impairment measured by the ODI with body fat percentage in patients with low back pain. Identifying this association could help optimize conservative treatment strategies and improve decision-making regarding referrals and surgical consideration.

Therefore, the objective of this study was to assess the association between lumbar functional status, measured using the Oswestry Disability Index, and body fat percentage in patients aged 30–45 years with low back pain attending a second-level regional hospital.

MATERIALS AND METHODS

Study Design

An observational, analytical, prospective, cross-sectional study was conducted.

Study Setting

The study was carried out in the outpatient Traumatology and Orthopedics Clinic of Hospital General Regional No. 1 of the Mexican Social Security Institute (IMSS), Veracruz Sur.

Population and Sample

Patients with a clinical diagnosis of low back pain who attended outpatient consultation between July 2024 and July 2025 were included. The final sample consisted of 96 patients, calculated using a finite population formula with a confidence level of 95%.

Inclusion Criteria

- Age between 30 and 45 years
- Clinical diagnosis of low back pain established by a specialist
- Under conservative treatment (pharmacological and/or rehabilitation)
- Signed informed consent

Exclusion Criteria

- Age below 30 or above 45 years
- No conservative management
- History of spinal surgery or current surgical protocol
- Diagnosis of lumbar spinal stenosis or myelopathy

- Refusal to participate

Variables

Dependent Variable: Lumbar functional status measured using the Oswestry Disability Index (ODI), categorized as:

- No disability (0–4 points)
- Mild disability (5–14 points)
- Moderate disability (15–24 points)
- Severe disability (25–34 points)
- Total disability (35–50 points)

Independent Variable:

Body fat percentage measured by bioelectrical impedance (Omron HBF-514C), categorized according to age- and sex-specific reference values into low, normal, high, and very high.

Additional variables included sex and age groups (30–35, 36–40, and 41–45 years).

Data Collection Procedure

After approval by the Local Ethics and Research Committee (registration number R-2024-3101-050), eligible patients were invited to participate. Following informed consent, data collection included a brief interview, application of the ODI questionnaire, and measurement of weight, height, and body fat percentage.

Statistical Analysis

Descriptive statistics were calculated using frequencies and percentages. The association between body fat percentage and ODI categories was assessed using the chi-square test. Effect size was estimated using Cramer's V. Statistical significance was set at $p < 0.05$. Analysis was performed using SPSS version 25.

RESULTS

A total of 96 patients were included; 56 were women (58%) and 40 men (42%). The most frequent age group was 36–40 years (46%).

According to ODI classification, 9% of patients had no disability, 16% mild disability, 45% moderate disability, 27% severe disability, and 3% total disability. Regarding body composition, 5% had low body fat percentage, 18% normal, 58% high, and 19% very high.

Patients with low and normal body fat were predominantly classified as having no disability or mild disability. In contrast, those with high and very high body fat percentages were concentrated in moderate, severe, and total disability categories. The association between body fat percentage and functional status was statistically significant ($\chi^2=120.48$; $df=12$; $p=0.000$), with a strong effect size (Cramer's $V=0.647$).

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Table 8. Percentage of body fat according to the Disability Index Functional Oswestry.

Percentage of body fat	Functional state of lumbar spine					Total Disability	X ² =120.48 p=0.000 V de Cramer=0.647
	With Disability	out Low Disability	Moderate Disability	Severe Disability			
Low	4	1	0	0	0		
Normal	5	12	0	0	0		
High	0	3	37	16	0		
Very High	0	0	6	9	3		
	9	15	43	25	3		

An association was found between the body fat index variable and the functional state of the lumbar spine, obtaining $\chi^2=120.48$, $gl=12$, $p=0.000$, Cramer's $V=0.647$: strong association, $n=96$.

DISCUSSION

This study demonstrates a strong association between body fat percentage and functional disability in adults aged 30–45 years with low back pain. Patients with higher levels of adiposity exhibited significantly worse functional status, including all cases of total disability observed.

These findings align with previous literature linking excess adiposity to mechanical overload of the lumbar spine, accelerated degenerative changes, and systemic low-grade inflammation, all of which contribute to pain persistence and functional impairment. Notably, the clear dose–response gradient observed supports biological plausibility beyond mere statistical correlation.

Using body fat percentage rather than BMI strengthens the analysis, as adiposity distribution may better explain functional outcomes in lumbar disorders.

CONCLUSION

A higher body fat percentage is significantly and strongly associated with worse lumbar functional status, as measured by the Oswestry Disability Index, in patients aged 30–45 years with low back pain. Body fat percentage should be incorporated as a relevant clinical indicator in the evaluation and conservative management of low back pain, prioritizing fat reduction before routine consideration of surgical intervention.

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