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Functional Disability Profile and Associated Factors Among Patients with Mechanical Low Back Pain Using Oswestry Disability Index at Sanjiwani General Hospital

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Abstract

Introduction: *Low Back Pain (LBP) is a major global musculoskeletal condition that significantly impairs daily physical function and productivity. Assessing functional disability in clinical settings is essential for designing targeted rehabilitation strategies.* ***Objective:*** *To evaluate the functional disability profile and examine the clinical and physical characteristics of patients with Mechanical LBP.* ***Methods:*** *An observational cross-sectional study was conducted among 42 Mechanical LBP patients at the Physical Medicine and Rehabilitation Clinic of Sanjiwani General Hospital Gianyar. Demographic, anthropometric, and occupational data were collected. Functional disability was evaluated using the Indonesian version of the Oswestry Disability Index (ODI). Data were analyzed using univariate descriptors, Pearson correlation, Spearman rank correlation, independent t-test, and Chi-square test.* ***Results and Discussion:*** *The mean ODI score was 19.81 ± 8.60, with the majority experiencing severe (40.5%) and moderate (35.7%) disability. A statistically significant moderate positive correlation was found between age and ODI score ($r = 0.416$, $p = 0.006$). No significant associations were observed between ODI scores and Body Mass Index ($r_s = -0.017$, $p = 0.914$), gender ($t = -1.437$, $p = 0.158$), or occupation ($p = 0.306$). However, linear-by-linear association revealed a significant trend toward higher disability in heavy physical laborers ($p = 0.021$).* ***Conclusion:*** *Patients with LBP predominantly present with moderate-to-severe functional disability. Advanced age and heavy physical workload are key contributors to functional impairment, underscoring the need for age-tailored active rehabilitation and ergonomic intervention.*

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Introduction

Low Back Pain (LBP) is recognized globally as a primary musculoskeletal condition that imposes a heavy socioeconomic burden and significantly reduces daily work productivity. According to official reports from the World Health Organization, LBP prevalence continues to escalate worldwide, affecting approximately 619 million people in 2023 and serving as a leading contributor to global disability among working-age populations.(Nazaruddin et al., 2025; Sa'dyah et al., 2025) In Indonesia, national survey data from Riskesdas recorded the prevalence of diagnosed musculoskeletal disorders at 24.7%, with LBP prevalence specifically estimated between 7.6% and 37%.(Sa'dyah et al., 2025) Local studies in Bali among office workers revealed an LBP prevalence of 31.9%, with high occurrence reported among females, individuals with normal Body Mass Index (BMI), and those working in forward-bending postures.(Wirata, 2024)

Anatomically, LBP is defined as pain, muscle tension, or stiffness localized between the 12th costal margin and the inferior gluteal folds, with or without lower limb radiation.(Rahmawati, 2021) Clinically, it is essential to distinguish between Mechanical and Non-Mechanical LBP. Mechanical LBP accounts for approximately 90% of cases, arising from abnormal biomechanical loading and musculoskeletal dysfunction of spinal structures, such as intervertebral discs, facet joints, and paraspinal muscles.(Ferdinandov et al., 2024; Wirth & Schweinhardt, 2024) It is typically exacerbated by physical movement or prolonged posture and alleviated by rest, in the absence of systemic warning signs (red flags).(Resorlu, 2023; Wirth & Schweinhardt, 2024) Conversely, Non-Mechanical LBP accounts for about 10% of presentations and is caused by underlying pathological conditions such as spinal infections, malignancies, inflammatory spondyloarthropathies, or visceral referred pain, which typically manifest as unremitting pain that persists at rest, night pain, and significant systemic symptoms.(Ferdinandov et al., 2024; Resorlu, 2023) The etiology of Mechanical LBP is multifactorial, driven by interactions between internal demographic factors (age and gender), anthropometric status (BMI), and physical occupational stressors.(Sa'dyah et al., 2025; Sutikno, 2022)

The main clinical impact of LBP is functional disability, which severely restricts basic activities of daily living such as prolonged sitting, standing, walking, and self-care.(Sutikno, 2022) In Physical Medicine and Rehabilitation (PMR) practice, the Oswestry Disability Index (ODI) questionnaire is recognized globally as the gold-standard instrument to objectively measure LBP-specific functional impairment.(Nurhikmawati et al., 2024) Although Sanjiwani General Hospital Gianyar serves a substantial number of LBP patients in its PMR clinic, comprehensive studies evaluating patient functional profiles alongside demographic and physical characteristics remain limited in this region.(Trisnayasa et al., 2024) Therefore, this study aimed to evaluate the functional disability profile using ODI scores and analyze its relationship with age, gender, BMI, and occupational workload among Mechanical LBP patients at Sanjiwani General Hospital Gianyar.

Method

An observational cross-sectional study was conducted at the Outpatient PMR Clinic of Sanjiwani General Hospital Gianyar from May 19 to June 19, 2026. Using consecutive total sampling, 42 Mechanical LBP patients aged 18 years or older, diagnosed by a PMR specialist, were enrolled after signing informed consent. Patients with specific LBP

(infection, malignancy, fractures), severe neurological deficits, or incomplete records were excluded.

Demographic, anthropometric, and occupational data were collected during single clinical visits. Body Mass Index (BMI) was categorized using WHO Asia-Pacific criteria, and occupational workload was classified into heavy (farmers, construction workers, laborers) and light/moderate physical load. Functional disability was evaluated using the validated Indonesian version of the Oswestry Disability Index (ODI).

Data were analyzed using IBM SPSS Statistics. Normality was assessed using the Shapiro-Wilk test. Bivariate analyses included Pearson correlation (age vs. ODI), Spearman rank correlation (BMI vs. ODI), independent t-test (gender vs. ODI), and Pearson Chi-square with Linear-by-Linear Association (workload vs. ODI). Statistical significance was set at $p < 0.05$. Ethical clearance was granted by the hospital ethics committee.

Result and Discussion

1. Results

Demographic and Clinical Characteristics

A total of 42 Mechanical LBP patients were analyzed. As presented in Table 1, females comprised 54.8% (n = 23) and males 45.2% (n = 19) of the sample. Housewives formed the largest occupational group (26.2%, n = 11), followed by private employees (19.0%, n = 8) and farmers (14.3%, n = 6). When categorized by occupational workload, 71.4% (n = 30) engaged in light/moderate physical work, while 28.6% (n = 12) performed heavy physical labor.

Table 1
Demographic and Physical Characteristics of Patients (N = 42)

Parameter / Variable	Category / Statistic	Value
Gender	Male, n (%)	19 (45.2%)
	Female, n (%)	23 (54.8%)
Occupation	Housewife, n (%)	11 (26.2%)
	Private Employee, n (%)	8 (19.0%)
	Farmer, n (%)	6 (14.3%)
	Construction Worker / Tradesman, n (%)	5 (11.9%)
	Civil Servant, n (%)	4 (9.5%)
	Retiree, n (%)	4 (9.5%)
	Trader / Merchant, n (%)	3 (7.1%)
	Laborer, n (%)	1 (2.4%)
Physical Workload	Light / Moderate Physical Load, n (%)	30 (71.4%)
	Heavy Physical Load, n (%)	12 (28.6%)
Age (years)	Mean ± SD (Range)	54.86 ± 13.67 (29–85)
BMI (kg/m2)	Mean ± SD (Range)	23.73 ± 3.27 (17.96–36.21)
BMI Category (WHO Asia-Pacific)	Underweight (< 18.50 kg/m2), n (%)	2 (4.8%)
	Normal Weight (18.50–22.99 kg/m2), n (%)	16 (38.1%)
	Overweight (23.00–24.99 kg/m2), n (%)	11 (26.2%)
	Obese (>= 25.00 kg/m2), n (%)	13 (31.0%)

SD: Standard Deviation; BMI: Body Mass Index.

The mean age of the participants was 54.86 ± 13.67 years (range: 29.00 to 85.00 years). The overall mean BMI was 23.73 ± 3.27 kg/m2. According to the WHO Asia-Pacific BMI classification shown in Table 1, 38.1% (n = 16) were normal weight, 26.2% (n = 11) overweight, 31.0% (n = 13) obese, and 4.8% (n = 2) underweight.

Functional Disability Profile

The functional disability profile assessed using the Oswestry Disability Index (ODI) is summarized in Table 2. The continuous mean ODI score was 19.81 ± 8.60 (range: 7.00 to 45.00). Categorically, severe disability was the most predominant degree (40.5%, n = 17), followed by moderate disability (35.7%, n = 15), very severe disability (19.0%, n = 8), and complete disability (4.8%, n = 2).

Table 2
Functional Disability Profile Based on Oswestry Disability Index (N = 42)

Disability Indicator	Category / Statistic	Value
Continuous ODI Score	Mean ± SD (Range)	19.81 ± 8.60 (7–45)
ODI Disability Classification	Moderate Disability (Score 7–14), n (%)	15 (35.7%)
	Severe Disability (Score 16–24), n (%)	17 (40.5%)
	Very Severe Disability (Score 25–34), n (%)	8 (19.0%)
	Complete Disability (Score 35–50), n (%)	2 (4.8%)

ODI: Oswestry Disability Index.

Bivariate Association Analyses

Shapiro-Wilk normality testing confirmed normal distribution for age (p = 0.795) and ODI score (p = 0.100), but non-normal distribution for BMI (p = 0.009). As summarized in Table 3, Pearson correlation analysis demonstrated a statistically significant moderate positive correlation between age and continuous ODI score (r = 0.416, p = 0.006). Conversely, Spearman rank correlation showed no significant association between continuous BMI and ODI score (r_s = -0.017, p = 0.914). Furthermore, an independent t-test revealed no significant difference in mean ODI scores between male (17.74 ± 10.05) and female patients (21.52 ± 6.96) (t = -1.437, p = 0.158).

Table 3
Bivariate Correlation and Difference Analyses on Continuous ODI Score

Independent Variable	Statistical Method	Test Value	p-value	Significance
Age vs. ODI Score	Pearson Correlation	r = 0.416	0.006	Significant (p < 0.01)
BMI vs. ODI Score	Spearman's Rho Correlation	r_s = -0.017	0.914	Non-significant (p > 0.05)
Gender vs. ODI Score	Independent Samples T-test	t = -1.437	0.158	Non-significant (p > 0.05)

r: Pearson correlation coefficient; r_s: Spearman rank correlation coefficient; t: Student's t-test statistic.

Cross-tabulation analyses between categorical predictor variables and ODI disability classifications are detailed in Table 4. Spearman rank correlation confirmed no significant association between Asia-Pacific BMI categories and ODI disability levels (r_s = -0.107, p = 0.499). Pearson Chi-square test across specific occupations was also non-significant (p = 0.306). However, the linear-by-linear association test across physical workload categories was statistically significant (p = 0.021), indicating a distinct trend where patients in heavy physical occupations experienced a higher proportion of severe-to-complete disability compared to light/moderate workers.

Table 4
Crosstabulation of Occupational Workload and Asia-Pacific BMI with ODI Disability Classification

Variable / Category	Moderate Disability	Severe Disability	Very Severe Disability	Complete Disability	Total	Test Statistic & p-value
Occupational Workload						
Heavy Physical Load	2 (16.7%)	5 (41.7%)	4 (33.3%)	1 (8.3%)	12 (100%)	Pearson Chi-Square p = 0.071
Light / Moderate Load	13 (43.3%)	12 (40.0%)	4 (13.3%)	1 (3.3%)	30 (100%)	Linear-by-Linear p = 0.021*
Asia-Pacific BMI Category						
Underweight	0 (0.0%)	2 (100%)	0 (0.0%)	0 (0.0%)	2 (100%)	Spearman Rank Correlation
Normal Weight	6 (37.5%)	6 (37.5%)	3 (18.8%)	1 (6.3%)	16 (100%)	r_s = -0.107
Overweight	3 (27.3%)	5 (45.5%)	2 (18.2%)	1 (9.1%)	11 (100%)	p = 0.499
Obese	6 (46.2%)	4 (30.8%)	3 (23.1%)	0 (0.0%)	13 (100%)	(Non-significant)

**Statistically significant trend (p < 0.05).*

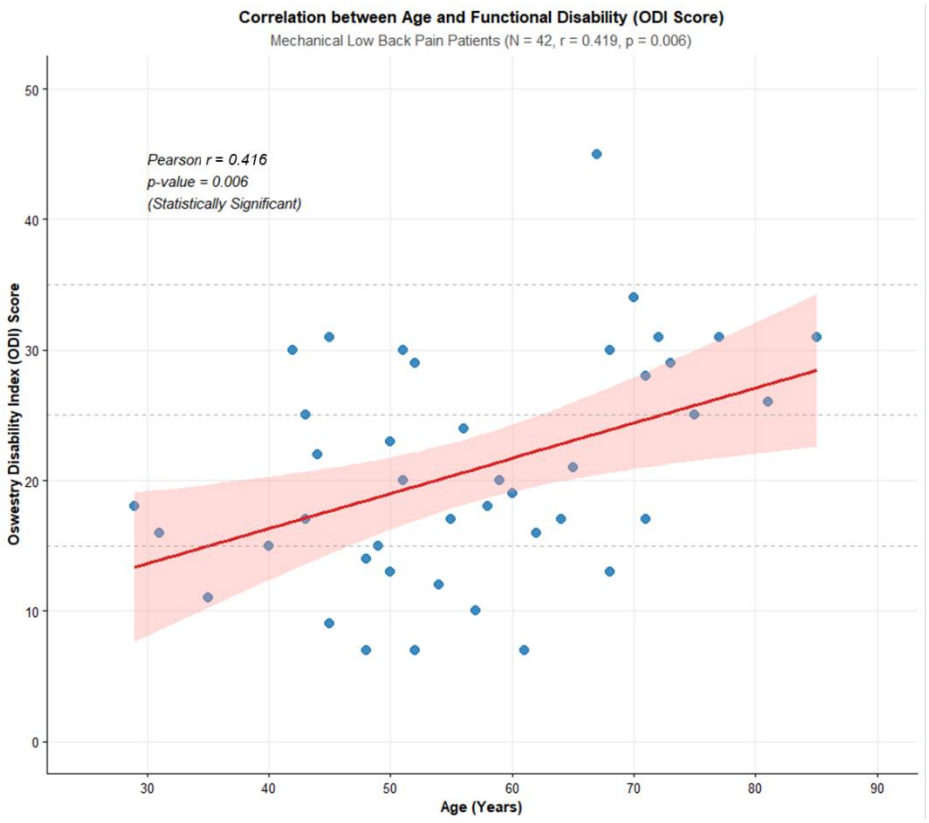

Figure 1. Pearson correlation analysis demonstrated a statistically significant moderate positive correlation between age and continuous ODI score (r = 0.416, p = 0.006)

2. Discussion

This study demonstrates that patients seeking rehabilitation for Mechanical LBP at Sanjiwani General Hospital Gianyar predominantly present with severe (40.5%) and moderate (35.7%) functional disability, with a mean continuous ODI score of 19.81 ± 8.60. The clinical concentration of cases in moderate-to-severe disability categories reflects regional healthcare-seeking behaviors in Bali. Patients frequently tolerate or treat mild-to-moderate low back discomfort using self-care or traditional remedies, seeking formal secondary rehabilitation care only when pain severely hinders daily functional activities such as prolonged sitting, standing, walking, and personal hygiene.(Wirata, 2024) Epidemiological evidence indicates that only 10% to 20% of LBP sufferers seek early formal medical care, leading to disease progression and noticeable functional impairment by the time of clinical presentation.(Sa'dyah et al., 2025; Trisnayasa et al., 2024)

A key finding of this study is the statistically significant moderate positive correlation between age and ODI score ($r = 0.416$, $p = 0.006$). From a spinal biomechanics and pathophysiological perspective, aging triggers irreversible degenerative changes in the lumbar spine. Progressive intervertebral disc dehydration and height loss increase axial load transfer onto facet joints and adjacent vertebral bodies, accelerating facet joint osteoarthritis, osteophyte formation, and ligamentum flavum hypertrophy that culminate in lumbar spinal stenosis.(Sa'dyah et al., 2025) Concurrently, age-related paraspinal sarcopenia (characterized by fatty infiltration and muscular atrophy of the multifidus and erector spinae muscles) compromises dynamic core stability and load tolerance.(Sutikno, 2022) Consequently, routine physical loads induce more severe pain and delayed recovery in older individuals, accelerating functional disability.

In contrast, Body Mass Index (BMI) showed no significant correlation with ODI scores, whether evaluated as a continuous parameter ($r_s = -0.017$, $p = 0.914$) or categorized by WHO Asia-Pacific status ($r_s = -0.107$, $p = 0.499$). Although excess adiposity theoretically increases static axial compression on lumbosacral segments, functional disability in clinical populations is primarily governed by acute pain perception, nerve root irritation, segmental instability, and individual muscular compensation rather than static anthropometric values alone.(Rahmawati, 2021; Sa'dyah et al., 2025) Normal-weight patients with massive nerve root compression from disc herniation can experience severe disability, whereas well-conditioned abdominal and back musculature in obese individuals may cushion mechanical loads and mitigate functional deficits.(Nazaruddin et al., 2025; Trisnayasa et al., 2024)

Regarding gender, no significant difference in mean ODI scores was found between males and females ($p = 0.158$). While females exhibit higher physiological susceptibility to LBP due to lower baseline muscle mass and estrogenic fluctuations affecting ligamentous laxity, both genders experience comparable levels of functional limitation once the disease reaches a clinical stage.(Trisnayasa et al., 2024; Wirata, 2024) Nevertheless, occupational physical workload significantly influenced disability severity (linear-by-linear $p = 0.021$). Workers in heavy physical occupations (farmers, construction workers, laborers) demonstrated a higher burden of severe-to-complete disability. Repetitive mechanical microtrauma from awkward working postures, frequent forward trunk flexion (stooping), heavy lifting, and dynamic axial loading elevates intradiscal pressure and stretches posterior longitudinal ligaments, promoting annular tears and chronic paraspinal muscle spasms.(Nurhikmawati et al., 2024)

These findings emphasize the need for secondary PMR services to move beyond passive physical modalities toward active, structured rehabilitation. Patient education on spinal ergonomic hygiene and targeted core stabilization exercises (strengthening the transversus abdominis and multifidus) should be integrated to restore dynamic spinal stability.(Sutikno, 2022) Given the strong link between advancing age and increased disability, core stabilization and dynamic flexibility programs must be prioritized and adapted for elderly patients to counteract paraspinal sarcopenia.(Sa'dyah et al., 2025)

Study limitations include the cross-sectional design, which precludes causal inferences. The modest sample size (n = 42) limited statistical power for multi-category occupational subgroup comparisons. Additionally, clinical parameters such as symptom duration, subjective pain scales (VAS/NRS), and radiological features (X-ray/MRI) were not analyzed, which future prospective cohort studies with larger cohorts should address.

Conclusion

Patients with Mechanical Low Back Pain presenting to outpatient physical rehabilitation services predominantly experience severe to moderate functional disability. Advancing age and heavy physical occupational workload are significant predictors associated with greater degrees of functional impairment. Conversely, Body Mass Index and gender show no significant correlation with functional disability levels once clinical presentation occurs. Clinical management should prioritize active core stabilization exercises, ergonomic education, and age-adapted rehabilitation strategies to preserve functional independence and prevent long-term disability.

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