



Relationship Between Pain Intensity and Workload with The Functional Degree of Low Back Pain in Warehouse Workers at The BULOG Rice Warehouse in Cirebon City

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ABSTRACT

Keywords: *Low Back Pain; pain intensity; workload; functional degree; pelvic coolies.*

Low Back Pain (LBP) is a leading cause of global disability and often occurs among informal sector workers who are exposed to high physical loads, such as pelvic coolies. Pain intensity and workload are thought to play a role in the decline in functional capacity, but evidence concerning informal worker populations remains limited. This study aims to analyze the relationship between pain intensity and workload with the functional degree of LBP in pelvic coolies at the BULOG Rice Warehouse in Cirebon City. An analytical observational study with a cross-sectional design was conducted on 38 pelvic coolies who met the inclusion criteria. Pain intensity was measured using the Numeric Rating Scale (NRS), workload was categorized by force weight (<20 kg; 20–30 kg; >30 kg), and functional degree was measured using the Back Pain Functional Scale (BPFS). Bivariate analysis used the Spearman correlation test with a significance level of $p < 0.05$. Most respondents experienced mild pain (52.63%) and a moderate workload (47.4%). The median functional degree of LBP was $55\% \pm 4.77\%$. There was a significant relationship between pain intensity and the functional degree of LBP ($p = 0.001$; $r = 0.530$) with moderate correlation strength and a positive direction. No association was found between workload and the functional degree of LBP ($p = 0.327$; $r = 0.163$). Pain intensity was significantly related to the functional degree of LBP in pelvic coolies, whereas workload did not show a meaningful relationship. The management of LBP in informal sector workers needs to focus on pain management and functional capacity improvement through rehabilitative approaches and work ergonomics.



INTRODUCTION

Low Back Pain (LBP) is one of the leading causes of global disability and is the largest contributor to Years Lived with Disability (YLDs) in various countries. This condition not only affects clinical aspects but also impacts work productivity, functional capacity, and economic burden, particularly among informal sector workers who rely on physical abilities as their main working capital. In Indonesia, informal workers such as pelvic coolies are at high risk of developing musculoskeletal disorders due to repetitive lifting and carrying of heavy loads for prolonged periods. Biomechanically, lifting and carrying activities increase intradiscal pressure, compressive stress on the lumbar vertebrae, and tension on the paraspinal soft tissues. Exposure to high and chronic physical workloads can lead to recurrent microtrauma, inflammation, muscle spasms, and degenerative changes that trigger Low Back Pain. Among pelvic coolies, unergonomic work patterns, long working hours, and insufficient rest increase the risk of persistent low back pain (Rohmawan & Hariyono, 2017; Saputra, 2020).

Pain intensity is a major clinical manifestation of LBP and is often the primary reason workers seek medical attention. Nevertheless, from a rehabilitative perspective, pain is not the only important indicator. Functional degrees—or levels of functional disability—describe the extent to which pain and musculoskeletal disorders affect an individual's ability to carry out

daily and work activities. Instruments such as the Back Pain Functional Scale (BPFS) are widely used to objectively measure the functional impact of LBP. The relationship between pain intensity and functional degree has been extensively studied, but findings show that pain is not always directly proportional to the degree of disability. Work factors, particularly physical workload, are believed to have independent and interactive contributions to functional decline. A high workload can exacerbate disability even when pain intensity is moderate because the demands of work force individuals to continue using the affected lumbar segment (Habir et al., 2023; Zakaria & Ariscasari, 2023).

Most previous studies have focused on formal sector workers, industrial employees, or the general population, whereas research on informal sector workers such as pelvic coolies remains limited. This group has unique characteristics: direct exposure to heavy loads on the shoulders and back, high lifting frequency, non-standardized lifting techniques, and a lack of occupational health protection. These conditions raise important scientific questions about how pain intensity and workload jointly relate to functional degrees in this population. The absence of specific data on pelvic coolies has led to limited evidence for ergonomic interventions, preventive programs, and rehabilitative approaches suitable to their work characteristics. Therefore, research on the relationship between pain intensity and workload with the functional degree of Low Back Pain in pelvic coolies is relevant and holds contextual novelty, especially in efforts to improve the occupational health of the informal sector (Hartvigsen et al., 2018; Hoy et al., 2012; Vos et al., 2020).

Based on this background, the purpose of this study is to analyze the relationship between pain intensity and workload with the functional degree of Low Back Pain in pelvic coolies at the BULOG Rice Warehouse in Cirebon City. Specifically, this study aims to identify the distribution of pain intensity, workload, and functional degree of LBP in the study population, as well as determine the strength and direction of the relationship between these variables. This research is expected to provide a more comprehensive scientific understanding and serve as a foundation for evidence-based promotive, preventive, and rehabilitative intervention planning.

The benefits of this research can be viewed from both theoretical and practical perspectives. Theoretically, it contributes to the development of scientific knowledge regarding the relationship between pain intensity, workload, and functional degree of LBP, particularly in the context of informal sector workers, which remains understudied. Practically, the results are expected to serve as input for relevant stakeholders, including company management and occupational health practitioners, in designing ergonomic intervention programs, workload management strategies, and appropriate rehabilitation approaches to improve the functional capacity and quality of life of pelvic coolies. For the workers themselves, this study can raise awareness of the importance of maintaining proper work posture and seeking early treatment when experiencing LBP symptoms to prevent severe functional decline.

RESEARCH METHOD

This research is an analytical observational study with a cross-sectional design. This approach was chosen to observe and analyze the relationship between pain intensity, workload, and the functional degree of Low Back Pain (LBP) in pelvic coolies. The population in this study consisted of pelvic coolies who worked at the BULOG Rice Warehouse in Cirebon City

and experienced low back pain, with a total of 38 participants. The inclusion criteria used in this study were pelvic coolies who had a history of LBP within the last three months, those aged between 30 and 58 years, and those who performed lifting activities for at least two hours per day. In contrast, pelvic coolies with a history of congenital spinal abnormalities such as lordosis, scoliosis, or kyphosis were excluded from the study.

The sample size was calculated using the Slovin formula with a 10% margin of error, which resulted in a minimum number of 38 respondents. Research data were collected through a questionnaire designed to obtain an overview of pain intensity and workload. The functional degree of LBP was measured using the Back Pain Functional Scale (BPFS). Pain intensity was measured using the Numeric Rating Scale (NRS), categorized into three levels: mild, moderate, and severe. Workload was also categorized into three levels: light (<20 kg), medium (20–30 kg), and heavy (>30 kg). BPFS measurements were expressed as percentages to provide a clearer representation of the functional degree of LBP. Descriptive data were presented in tabular form and expressed as frequencies and percentages to provide a clearer overview. Bivariate analysis was performed using the Spearman correlation test to identify the relationship between pain intensity and the functional degree of LBP, as well as between workload and the functional degree of LBP. The results were considered statistically significant at a p-value < 0.05. This study also received ethical approval (No. 40/EC/FKUGJ/V/2024) from the Ethics Commission of the Faculty of Medicine, Swadaya Gunung Jati University, Cirebon, Indonesia, confirming that it meets the required ethical research standards.

RESULTS AND DISCUSSION

This study was followed by 38 employees as male respondents.

Table 1. Distribution of pain intensity in pelvic coolies

Pain Intensity	Frequency (n)	Percentage (%)
Lightweight	20	52.63
Medium	18	47,37
Weight	0	0
TOTAL	38	100

Source: Primary Data from Research Results, 2025

Based on table 1. The results of the study were obtained that the frequency of pain intensity experienced by pelvic coolers experienced the most mild pain with a frequency of 20 (52.63%).

Table 2. Workload attribution in pelvic coolies

Workload	Frequency (n)	Percentage (%)
Lightweight	8	23,1
Medium	18	47,4
Weight	12	31,6
TOTAL	38	100

Source: Primary Data from Research Results, 2025

Based on table 2. The results of the study were obtained that the frequency of workload experienced by pelvic coolies was the highest workload, which was a moderate workload of 8 (47.4%).

Table 3. Functional degree distribution Low back pain

Variabel	Median ± Std Deviation
Degree of Functional Low back pain	55% ± 4.77%

Source: Primary Data from Research Results, 2025

Based on table 3. The above shows an overview of the functional degree of low back pain in pelvic coolies at the Bulog rice Warehouse in Cirebon City, obtained a median score of 55% of the total Back Pain Functional Score with a standard deviation of 4.77%.

Table 4. The Relationship between Pain Intensity and Functional Degree of Low Back Pain

		Low Back Pain
Pain Intensity	p value	0,001
	r	0,530
	N	38

Source: Processed Data Analysis Results, 2025

Based on the above results, a P value of 0.001 was obtained which shows that the correlation between pain intensity and functional degree of LBP is less than a significance value of 0.05, then it can be concluded that there is a relationship between pain intensity and functional degree of LBP. A Spearman correlation value of 0.530 indicates that the direction of correlation is positive with a strong correlation strength (0.40 – 0.599).

Table 5. The Relationship between Workload and Functional Degree Low Back Pain

		Low Back Pain
Workload	p value	0,327
	r	0,163
	N	38

Source: Processed Data Analysis Results, 2025

Based on the results above, a p value of 0.327 ($P > 0.05$) was obtained, which shows that there is no relationship between workload and functional degree low back pain. It was obtained that the level of correlation strength was 0.163, which was very weak.

The Relationship between Pain Intensity and Functional Degree of Low Back Pain

The results of the study showed a significant correlation ($p < 0.05$), indicating a relationship between pain intensity and the functional degree of Low Back Pain (LBP) in pelvic coolies who work at the BULOG Warehouse in Cirebon City. This demonstrates a meaningful relationship between pain intensity and functional degree in LBP patients. The higher the pain intensity experienced, the greater the degree of functional limitation. These findings align with the concept of pain pathophysiology, wherein an increase in nociceptive stimuli elicits a protective response in the form of muscle spasms, motion inhibition, and decreased lumbar stability, ultimately limiting functional activity. In addition to biomechanical factors,

neurophysiological aspects also play a role. Chronic pain in LBP often involves central sensitization, where the pain threshold decreases and pain perception increases. This causes functional limitations to arise not only from structural damage but also from alterations in the central nervous system. Therefore, high pain intensity can worsen disability even when radiological findings are not significant (Steffens et al., 2016; Wu et al., 2020).

Psychosocial factors such as fear-avoidance beliefs, anxiety, and depression also mediate the relationship between pain intensity and function. The fear-avoidance model explains that individuals who experience severe pain tend to avoid physical activity for fear of aggravating their condition, resulting in muscle deconditioning and reduced functional capacity. Thus, the relationship between pain intensity and functional degree is likely not purely linear but influenced by psychological and social factors. Nevertheless, it is important to note that the relationship does not always show a strong correlation. Some studies report patients with moderate pain intensity but severe disability and vice versa. This shows that functional degree is a multidimensional construct influenced by physical, psychological, occupational, age, and activity-related factors (Balagué et al., 2012; Islamiyah & Inayah, 2023; Rahmawati, 2021).

Clinically, these findings have important implications for the management of LBP. The therapeutic approach should focus not only on pain reduction but also on functional improvement through therapeutic exercise, ergonomic education, and biopsychosocial interventions. Evaluation of pain intensity using the Numeric Rating Scale (NRS) should always be combined with assessments of functional degree to provide a comprehensive understanding of the patient's condition (Rizki & Saftarina, 2020).

The Relationship of Workload to Functional Degree of Low Back Pain

The results of this study indicate no significant relationship between workload and functional degree in Low Back Pain (LBP) patients. These findings suggest that the level of workload experienced by respondents does not directly contribute to the degree of disability or functional limitation measured using the Back Pain Functional Scale (BPFS). Workloads involving physical activities such as heavy lifting, prolonged static positions, or repetitive movements are often associated with an increased risk of LBP. However, this study shows that although workload can be a risk factor for the onset of LBP, it does not necessarily determine the severity of functional limitations experienced by individuals (Andini, 2015; Purwata et al., 2015).

Several factors may explain this lack of association. The functional degree in LBP is a multifactorial condition influenced not only by biomechanical factors but also by psychological, social, and individual factors. The biopsychosocial model explains that pain perception, fear-avoidance beliefs, stress levels, and social support play significant roles in determining a person's degree of disability. Another possible explanation is physiological and ergonomic adaptation among individuals with heavy workloads. Workers exposed to high workloads over a long period may develop musculoskeletal conditioning or adaptation, enabling them to maintain daily functioning despite LBP. Moreover, proper work techniques and the application of ergonomic principles can minimize the impact of workload on functional capacity.

The characteristics of the sample and the workload measurement methods may also have influenced the results. When workload is measured subjectively through a perception-based questionnaire without objective assessment (e.g., ergonomic or biomechanical analysis),

potential information bias may occur. Similarly, variation in work types among participants may introduce heterogeneity that obscures statistical relationships. Furthermore, the degree of function in LBP tends to correlate more strongly with pain intensity than with initial physical risk factors such as workload. This implies that although workload can contribute to the onset of LBP, the severity of disability depends more on the intensity of pain and how individuals respond to it. Clinically, these findings confirm that interventions to improve functional degree in LBP patients should not focus solely on modifying workload but require a comprehensive approach including pain management, lumbar strengthening and stabilization exercises, and psychosocial interventions (Ak., 2023; Buchbinder et al., 2018; Foster et al., 2018; Knezevic et al., 2021; Maher et al., 2017).

CONCLUSION

Based on the results of the study, it was concluded that there is a significant relationship between pain intensity and the functional degree of Low Back Pain (LBP), whereas no relationship was found between workload and the functional degree of LBP. These findings indicate that pelvic coolies who experience LBP may suffer a decline in work productivity. Therefore, it is important to provide education on ergonomic lifting techniques and implement appropriate rehabilitation measures to improve the functional degree of LBP. The implications of this study highlight the need to develop intervention programs that emphasize awareness of workplace ergonomics, which in turn can help reduce the incidence of LBP and enhance workers' quality of life and productivity.

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