The Relationship Between Work Posture and The Incidence of Low Back Pain Among Laundry Workers in The Area of Campus 1, Muhammadiyah University of Surakarta

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Abstract.

This study investigated the association between work posture and low back pain (LBP) among Campus 1, Muhammadiyah University of Surakarta laundry workers. A cross-sectional analytical observational design was used to study 50 workers from 36 washing facilities selected by total sampling. The Rapid Entire Body Assessment (REBA) monitored work posture, while a validated Pain and Distress Scale questionnaire measured LBP symptoms. Data was collected from December 2024 to January 2025 and analyzed using univariate and bivariate chi-square tests. REBA found that most workers had low to moderate risk postures, while some had high-risk postures that could cause musculoskeletal diseases. Most LBP complaints were modest, but moderate and severe were notable. A substantial correlation ($p < 0.05$) exists between work posture and LBP, with higher posture risk leading to more complaints. These findings highlight the importance of ergonomics and preventive interventions in reducing occupational LBP among laundry workers.

Keywords: *Ergonomics; low back pain; laundry workers; musculoskeletal disorders and work posture.*

I. INTRODUCTION

Each occupation carries a different level of risk, particularly manual handling jobs, which require greater attention due to their high physical demands and potential to cause injury when performed incorrectly or over prolonged periods [1] . Workers who frequently experience Low Back Pain (LBP) come from various sectors, including manufacturing, healthcare, offices, transportation, and construction, where improper or non-ergonomic work postures such as prolonged sitting in a slouched position, lifting heavy loads without proper technique, repetitive movements, pushing, pulling, or other physically demanding activities significantly increase the risk of musculoskeletal disorders [2]. Poor posture places continuous pressure on the muscles, ligaments, and spinal structures, leading to tension, reduced oxygen and nutrient supply due to continuous muscle contraction, lactic acid accumulation, and ultimately pain [3]. LBP, defined as pain in the lumbosacral area that may present as local or radicular pain caused by inflammation of the spine, muscles, nerves, tendons, or joints, can result from congenital abnormalities, trauma, tissue degeneration, and particularly incorrect ergonomic positioning [4]

The global prevalence of low back pain (LBP) varies annually between 15–45%. According to WHO in [5], 33% of people in developing countries experience persistent pain. Back discomfort affects 17.3 million English people, with 1.1 million disabled. Low back discomfort affected 26% of US adults in the past three months. The Indonesian Basic Health Research (2018) found 11.9% of health professionals identified musculoskeletal illnesses and 24.7% based on symptoms. LBP cases in Indonesia are estimated between 7.6%–37%. According to Central Bureau of Statistics (2018), 26.74% of working individuals aged ≥15 have health concerns [6], partly due to declining muscle strength with age. Work fatigue caused by inadequate facilities, infrastructure, and non-ergonomic work environments contributes to reduced productivity. Ergonomic practices are closely related to occupational safety, health, and comfort, aiming to balance human, job, and environmental factors [7]. Non-ergonomic work postures can accelerate fatigue and increase the risk of LBP, particularly when working ≥8 hours per day [8] . Supporting this, [9] found that 90% of back-office employees at RS Medika BSD required posture improvement, with a significant correlation between work posture and LBP complaints (Spearman test, $p = 0.009$).

In a study by Tri Utama, 74 respondents had poor working postures, with 59.6% experiencing Low Back Pain and 8.3% not. The chi-square test revealed a significant correlation between working posture and Low Back Pain among oil palm farmers ($p < 0.05$) [10]. Low back pain is a leading cause of activity

limitation and work absenteeism [11]. Long-term static working positions are linked to Low Back Pain (LBP), one of the most frequent workplace musculoskeletal disorders [12], which can lower worker productivity and product quality.wash service personnel, who often have high workloads, limited time, heavy load handling, and enormous wash volumes, are at risk for Low Back Pain (LBP). In addition to excessive workload, non-ergonomic working postures such as repetitive lifting, bending, and other back-straining movements contribute substantially to musculoskeletal stress affecting the lower back and spinal support structures, thereby increasing the risk of LBP among employees. Based on the background described above, prolonged exposure to improper working positions can lead to recurrent lower back pain complaints among workers. The findings of this study are expected to serve as a reference for controlling LBP complaints among laundry workers and to provide an early warning for the related companies to implement preventive measures, including improved work system management, education, and training programs on LBP prevention in the future.

II. METHODS

This cross-sectional analytical observational study examined the link between work posture and Low Back Pain in laundry workers on Campus 1, Muhammadiyah University of Surakarta. The research was conducted from December 2025 to January 2026 at 36 laundry facilities located around Jl. Duwet Raya, Jl. Mendungan, Jl. Menco Raya, Jl. Garuda Mas, Jl. Gatak 1, and Jl. Gatak 3, involving a total of 50 workers selected through total sampling to ensure full population coverage. Work posture was measured using the REBA (Rapid Entire Body Assessment) scoring sheet, which was characterized as very low (1), low (2–3), moderate (4–7), high (8–10), and very high (11) on an ordinal scale. A questionnaire based on The Pain and Distress Scale for Low Back Pain complaints assessed acute or chronic lower back pain with response options of never, seldom, often, and always on an ordinal scale. This quantitative study obtained primary data from validated and verified closed-ended questionnaires sent after informed consent, confidentiality, and voluntary participation. Data collection was conducted in three stages: preparation (July–December 2024), implementation (site permissions, visits, and questionnaire distribution), and completion (data processing and report writing). Data were processed through editing, coding, entry into SPSS, scoring, and tabulation, and analyzed using univariate analysis to describe variable characteristics and bivariate analysis with the chi-square test to assess the relationship between work posture and Low Back Pain complaints, with results presented as distributions and percentages.

III. RESULT AND DISCUSSION

Overview of the Research Site

This study was conducted at laundry service businesses located around Campus 1 of Universitas Muhammadiyah Surakarta, specifically in the areas of Jl. Duwet Raya, Jl. Mendungan, Jl. Menco Raya, Jl. Garuda Mas, Jl. Gatak 1, and Jl. Gatak 3. These areas have high student activity, leading to the growth of small- to medium-scale laundry businesses that primarily rely on manual tasks such as sorting clothes, lifting wet laundry, loading and unloading washing machines, ironing, and folding. Workers frequently perform these activities in prolonged standing, bending, and repetitive lifting positions, while existing facilities do not fully meet ergonomic principles. These factors raise the risk of musculoskeletal illnesses, including Low Back Pain. Thus, this area was chosen to study laundry workers' work posture and Low Back Pain.

Respondent Characteristics

Based on research conducted on laundry workers in the Campus 1 area of Muhammadiyah University of Surakarta, the results of the questionnaire revealed respondent characteristics including age and gender:

Table 1. Respondent Characteristics

Respondent Characteristics	n	%
Age		
Early Adulthood (19 – 29 years)	12	24%
Middle Adulthood (30 – 44 years)	20	40%
Late Adulthood (45 – 62 years)	18	36%

Gender	10	20%
Male	40	80%
Female		
Years of Service		
New (1 – 3 years)	37	74%
Moderate (4 – 6 years)	4	8%
Long (≥ 7 years)	9	18%
Working Hours per Day		
Normal (4 – 8 hours)	30	60%
Long (9 – 12 hours)	17	34%
Very Long (≥ 13 hours)	3	6%

Based on Table 1, the study involved 50 respondents, predominantly aged 30–44 years (middle adulthood) with 20 individuals (40%), followed by 18 respondents aged 45–62 years (36%) and 12 aged 19–29 years (24%). The majority were female (40 respondents; 80%), while males accounted for 10 respondents (20%). In terms of work tenure, most respondents had a short working period of 1–3 years (37 respondents; 74%), compared to 9 respondents (18%) with ≥7 years and 4 respondents (8%) with 4–6 years, indicating relatively limited work experience overall. Regarding daily working hours, 30 respondents (60%) worked normal hours (4–8 hours), 17 respondents (34%) worked 9–12 hours, and 3 respondents (6%) worked ≥13 hours per day, suggesting that although most had standard working durations, a proportion exceeded normal working hours.

Analysis of Research Variables

This subchapter contains research data for work posture and low back discomfort among laundry workers in Campus 1 Area, Muhammadiyah University of Surakarta, which are presented in tables showing frequency and percentage.

Table 2. Job Positions of Laundry Workers in the Campus 1 Area of Muhammadiyah University of Surakarta

Category	Frequency	Percentage
Low	24	48%
Medium	20	40%
High	6	12%
Total	50	100%

Table 2 shows that 24 respondents (48%) had a low work posture category while working, indicating that nearly half of the respondents had a less ergonomic or low-risk work posture, as measured and analyzed using the Rapid Entire Body Assessment (REBA) method. The highest REBA score for work posture assessment was 8, while the lowest was 3.

Table 3. Low Back Pain Complaints in Laundry Workers in the Campus 1 Area of Muhammadiyah University of Surakarta

Category	Frequency	Percentage
Low	28	56%
Medium	16	32%
High	6	12%
Total	50	100%

Table 3 reveals that 28 respondents (56%) reported low back discomfort, indicating that more than half of the respondents had low back pain. The lowest low back pain score was 20 and the highest 50.

Table 4. Analysis of the Relationship between Work Position and Low Back Pain Complaints in Laundry Workers in the Campus 1 Area of Muhammadiyah University of Surakarta

Job Position	Low Back Pain								p value
	Low		Medium		High		Total		
	N	%	n	%	n	%	n	%	
Low	22	44%	2	4%	0	0%	24	48%	0.000
Medium	6	12%	13	26%	1	2%	20	40%	
High	0	0%	1	2%	5	10%	6	12%	
Total	28	56%	16	32%	6	12%	50	100%	

The respondents' low back pain complaints increased with work position, as seen in Table 4. A p-value of 0.000 ($p < 0.05$) indicates a significant correlation between work posture and low back discomfort among laundry workers.

Discussion

Respondent Characteristics

Based on the study results, the majority of respondents were in the middle adulthood age group (30–44 years), a period when physical capacity begins to decline, affecting the body's ability to withstand work demands. Musculoskeletal complaints typically emerge around age 35 and tend to increase with age due to decreasing muscle strength and endurance, with a notable decline at age 60 [13]. Most respondents were female, which may increase susceptibility to musculoskeletal complaints during activities involving prolonged standing, bending, and lifting. Regarding work experience, most respondents had a short tenure (1–3 years), indicating they were still adapting to work demands, and work duration is a significant factor influencing muscle pain complaints [14]. Respondents typically worked more than 8 hours per day, which can elevate physical fatigue and the risk of low back pain due to muscle and skeletal strain. While longer work experience can provide valuable skills, it may also lead to fatigue and boredom [15], aligning with research showing a significant relationship between work duration and low back pain complaints [16].

Job Positions for Laundry Workers

The study results showed that nearly half of the respondents had work postures categorized as low risk based on the Rapid Entire Body Assessment (REBA). However, even within this low-risk category, laundry workers' postures still posed potential musculoskeletal hazards. Tasks such as loading and unloading laundry, ironing, and lifting wet clothes were performed while standing, bending, and repeatedly lifting, with workers often focusing on meeting work targets and overlooking improper postures that cause discomfort. Work posture is a key factor in job effectiveness, and non-ergonomic or unnatural postures can lead to musculoskeletal disorders; the worse the posture, the greater the complaints [17]. Even low-risk postures can cause issues if maintained continuously over long durations, as exposure time also influences risk [18]. These findings indicate that workplace facilities and posture arrangements in the laundry business at Campus 1, Muhammadiyah University of Surakarta, have not fully applied ergonomic principles, putting workers at risk of occupational health problems, particularly low back pain.

The Relationship Between Work Position and Low Back Pain Complaints

The chi-square test revealed a significant correlation between work posture and low back discomfort among laundry workers at Campus 1, Muhammadiyah University of Surakarta ($p < 0.05$). Workers' low back pain complaints increase with work posture risk. This finding aligns with ergonomic theory, which states that non-ergonomic work postures cause prolonged static muscle contractions, impede blood flow to the muscles, and lead to lactic acid buildup that triggers lower back pain.This is consistent with a previous study conducted by [19], which explained that work posture has a significant relationship with low back pain complaints among laundry workers in Batam Kota District, with a p-value of 0.016 ($p < 0.05$). The p-value of 0.016 ($p < \alpha$) indicates a meaningful association in the data analysis. Another study found a significant correlation between body posture and low back pain in laundry workers, with a p-value of 0.010, below the significance level of $\alpha = 0.05$.This supports [20], which found that work posture, repeated tasks, load, and vibration increase low back pain risk. They also identified a positive link between work posture and low back discomfort ($p = 0.029$; $r = 0.337$). Thus, significant low back pain is more likely in people with more postural discomfort [21].According to statistical analysis, laundry workers' low back pain complaints are linked to work posture. Standing, bending, and lifting can strain muscles and the lower spine. High-risk work posture increases the risk of low back pain. Thus, better work posture and ergonomics are crucial to reducing low back discomfort in laundry workers.

IV. CONCLUSION

According to the Rapid Entire Body Assessment (REBA), most laundry workers at Campus 1, Muhammadiyah University of Surakarta had low to moderate risk postures, but some had high-risk postures that could lead to musculoskeletal disorders. mild back pain complaints were largely mild, although

moderate and high complaints were substantial, indicating a widespread occupational concern. Significant correlation ($p < 0.05$) between work posture and low back pain, with higher posture risk leading to more complaints, indicating posture as a critical determinant in low back pain occurrence. To prevent musculoskeletal disorders, laundry owners are advised to implement ergonomic work systems, including adjustable ironing tables, supportive chairs, and scheduled breaks; workers should maintain proper posture, stretch regularly, and avoid prolonged bending; and future research could adopt longitudinal designs and consider additional variables such as body mass index, physical activity, and psychosocial factors. Preventive ergonomic measures are expected to minimize low back pain and maintain worker health and productivity.

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