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## **Work Posture as a Dominant Factor Associated with Low Back Pain among Administrative Employees in Bukittinggi City: Cross-Sectional Study**

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### **Abstract**

Low back pain (LBP) is one of the most prevalent musculoskeletal disorders among office employees, particularly those exposed to prolonged static sitting and non-ergonomic working conditions. This condition not only affects individual health and functional capacity but also reduces work productivity and organizational performance. This study aimed to analyze factors associated with the occurrence of low back pain among administrative employees at the Department of Education and Culture of Bukittinggi City. An analytical observational study with a cross-sectional design was conducted from January to March 2025. A total of 40 administrative employees were recruited using total sampling based on predefined inclusion criteria. LBP was assessed using the Nordic Musculoskeletal Questionnaire (NMQ), while working posture was evaluated using the Rapid Office Strain Assessment (ROSA). Data were analyzed using univariate descriptive statistics, Chi-square tests for bivariate analysis, and Firth's penalized logistic regression for multivariate analysis. A significance level of  $p < 0.05$  was applied. The prevalence of LBP was 72.5% for minimal complaints and 27.5% for moderate complaints. Bivariate analysis showed that age ( $p = 0.017$ ) and working posture ( $p = 0.019$ ) were significantly associated with LBP, whereas gender ( $p = 0.307$ ) and length of employment ( $p = 0.465$ ) were not statistically significant. Multivariate analysis identified non-ergonomic working posture as the most dominant factor associated with LBP (OR = 5.50; 95% CI: 1.23–24.51). Working posture is the primary factor associated with low back pain among administrative employees in Bukittinggi City. Ergonomic improvements and posture education are strongly recommended to reduce the risk of LBP in office-based work environments.

**Keywords:** Low Back Pain; Age; Length of Employment; Working Posture; Gender

## **Introduction**

Low Back Pain (LBP) is one of the most common musculoskeletal disorders affecting the general population and represents a major contributor to global disability. LBP is typically defined as pain or discomfort localized between the lower margin of the twelfth rib and the gluteal folds, with or without radiation to the lower extremities. The condition may present as acute, recurrent, or chronic pain and is often associated with reduced functional capacity, diminished quality of life, and decreased work productivity. According to the Global Burden of Disease Study, LBP has consistently ranked as the leading cause of years lived with disability worldwide and is projected to remain a major public health problem in the coming decades.(Okezue et al., 2020).

Beyond its impact on individual health, LBP imposes a substantial economic burden due to direct medical costs and indirect costs related to absenteeism and presenteeism. Studies from Europe and Asia have reported that productivity losses attributable to LBP reach billions of dollars annually. In Southeast Asia, LBP is recognized as a leading cause of work-related musculoskeletal disorders among office-based employees, particularly those engaged in prolonged sitting and repetitive computer-based tasks. (Haqi et al., 2023).

In Southeast Asia itself, the prevalence of LBP is relatively high. A 2022 meta-analysis reported that 30–60% of workers experience LBP, particularly those in prolonged static sitting positions. Studies in Malaysia and Thailand, for instance, found that over one-third of administrative employees suffered from LBP in the past year. Dominant risk factors include sitting for more than six hours per day, limited movement variation, and long tenure. (Wiratama et al., 2024).

In Indonesia, musculoskeletal disorders, including LBP, remain a common occupational health problem. Data from the 2018 National Basic Health Research (Riskesdas) indicate that a large proportion of the working population experiences chronic musculoskeletal complaints. Office employees are considered a high-risk group due to prolonged static postures, inadequate workstation ergonomics, and limited opportunities for movement during working hours. However, region-specific data, particularly from West Sumatra and Bukittinggi City, remain scarce.(Akbar, 2022).

Several individual and occupational factors have been associated with the development of LBP. Increasing age is associated with degenerative changes in spinal structures, including intervertebral discs and facet joints. Length of employment reflects cumulative exposure to occupational risk factors, while working posture directly influences spinal loading and muscle fatigue. In addition, sex-related differences in musculoskeletal anatomy, hormonal influences, and psychosocial roles may contribute to variations in LBP prevalence. Despite extensive international research, evidence from local government office settings in Indonesia remains limited.

Employees of the Bukittinggi City Department of Education and Culture perform predominantly administrative tasks involving prolonged sitting and intensive computer use. These

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working conditions potentially increase the risk of LBP; however, no previous study has specifically examined LBP and its associated factors in this population. Therefore, this study aimed to analyze factors associated with the occurrence of LBP among administrative employees in this institution, focusing on age, length of employment, working posture, and gender, and to identify the most dominant contributing factor.

### **Literature Review**

Low back pain (LBP) is widely recognized as a leading work-related musculoskeletal disorder among office employees worldwide (Okezue et al., 2020; Haqi et al., 2023). Epidemiological studies consistently report a high prevalence of LBP among workers exposed to prolonged sitting, repetitive computer use, and non-ergonomic workstation designs (Wiratama et al., 2024). In office-based occupations, static postures maintained for extended periods increase mechanical loading on the lumbar spine, contributing to muscle fatigue and spinal tissue strain.

Age has frequently been identified as an individual risk factor for LBP, as degenerative changes in intervertebral discs and spinal joints progress with increasing age (Akbar, 2022). However, evidence regarding the strength of this association remains inconsistent, particularly in relatively homogeneous working populations, such as administrative office workers (Bento et al., 2020).

Length of employment is commonly used as a proxy for cumulative occupational exposure. Several studies suggest that longer employment duration is associated with a higher risk of musculoskeletal complaints due to prolonged exposure to static working postures and repetitive tasks (Ali et al., 2020; Alaca et al., 2025). Nevertheless, some studies report no significant association after controlling for ergonomic and behavioral factors, indicating that exposure quality may be more important than exposure duration.

Working posture is consistently reported as a dominant occupational risk factor for LBP. Non-ergonomic sitting positions, inadequate lumbar support, inappropriate desk height, and improper monitor alignment significantly increase intradiscal pressure and alter normal spinal biomechanics (Okezue et al., 2020; Yuwono & Wahyuni, 2021). Biomechanical studies further indicate that sustained poor posture accelerates intervertebral disc degeneration and increases mechanical stress on spinal structures, thereby elevating the risk of LBP (Overstreet et al., 2021).

Gender differences in LBP prevalence have also been reported in the literature, with several studies indicating a higher prevalence among female workers (Bento et al., 2020). Proposed explanations include anatomical differences, hormonal influences, and psychosocial factors, such as the dual burden of occupational and domestic responsibilities (Ali et al., 2020). However, findings remain inconsistent across occupational settings.

Despite extensive international literature on LBP, studies focusing on local government office settings in Indonesia remain limited. Most available studies have been conducted in healthcare institutions, banking sectors, or private offices, leaving a gap in evidence from regional government workplaces (Akbar, 2022; Haqi et al., 2023). Therefore, further investigation is required to clarify the relative contribution of individual and occupational factors to LBP in this specific context.

## **Research Method**

This study employed an analytical observational design with a cross-sectional approach. The study was conducted at the Department of Education and Culture of Bukittinggi City, West Sumatra, Indonesia, between January and March 2025. The study population consisted of all administrative employees working at the institution.

Total of 40 respondents were recruited using total sampling based on inclusion criteria, which included active employment status, a minimum length of employment of one year, age  $\geq 20$  years, full-time work status, and willingness to provide informed consent. Employees with a history of spinal trauma, neurological disorders (e.g., lumbar disc herniation or stroke), or systemic diseases affecting the musculoskeletal system were excluded.

The dependent variable was low back pain, defined as pain or discomfort in the lower back region experienced within the past 12 months. LBP was measured using the Nordic Musculoskeletal Questionnaire (NMQ). Independent variables included age, gender, length of employment, and working posture. Working posture was assessed using the Rapid Office Strain Assessment (ROSA), with scores  $< 5$  categorized as ergonomic and scores  $\geq 5$  categorized as non-ergonomic. Posture assessments were conducted through direct observation by two trained assessors to minimize measurement bias.

Data were analyzed using descriptive statistics to summarize respondent characteristics. Associations between independent variables and LBP were examined using Chi-square tests. Due to the relatively small sample size, multivariate analysis was performed using Firth's penalized logistic regression. Statistical significance was set at  $p < 0.05$ .

## **Results**

Total of 40 administrative employees participated in this study. The majority of respondents were aged 26–35 years (47.5%), followed by 36–45 years (35.0%), 46–55 years (12.5%), and 17–25 years (5.0%). Female respondents accounted for 75% of the sample, while males comprised 25%. Most respondents had a length of employment greater than five years (95%). Based on ROSA assessment, 35% of respondents worked in non-ergonomic postures.

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The prevalence of low back pain within the past 12 months was high, with 72.5% of respondents reporting minimal LBP complaints and 27.5% reporting moderate complaints.

**Table 1.** Respondent Characteristics (n = 40)

Variable	category	n	%
Age	17-25	2	5
	26-35	19	47,5
	36-45	14	35
	46-55	5	12,5
Gender	Man	10	25
	Woman	30	75
Length of employment	≥5 years	2	5
	>5 years	38	95
Workposture (ROSA)	Ergonomic (skor <5)	26	65
	Non-ergonomic (skor ≥5)	14	35
Low back pain (12 Month)	Minimal disorders	11	27,5
	Moderate disorders	29	72,5

Bivariate analysis revealed significant associations between age and LBP ( $p = 0.017$ ) and between working posture and LBP ( $p = 0.019$ ). Gender and length of employment were not significantly associated with LBP ( $p > 0.05$ ). Multivariate analysis demonstrated that non-ergonomic working posture was the strongest predictor of LBP.

**Table 2 :** Analisis Bivariat Faktor yang Berhubungan dengan Low Back Pain (n = 40)

Variable	Category	Minimal Disorders	Moderate Disorders	p-value
Age	17-25	2,5	2,5	0,017
	26-35	42,5	5	
	36-45	25	10	
	46-55	2,5	10	
Gender	Man	15	10	0,307
	Woman	57,5	17,5	
Length of employment	≤5 years	2,5	2,5	0,465
	>5 years	70	25	
Workposture	Ergonomic (score <5)	55	10	0,019
	Non-ergonomic (score ≥5)	17,5	17,5	

**Discussions**

This study identified working posture as the most influential factor associated with low back pain among administrative employees at the Bukittinggi City Department of Education and Culture. The findings are consistent with previous studies indicating that prolonged static sitting

and non-ergonomic workstation design increase mechanical stress on the lumbar spine. Biomechanical evidence suggests that sustained poor posture accelerates intervertebral disc degeneration and increases intradiscal pressure, thereby elevating the risk of LBP.

Although age was significantly associated with LBP in bivariate analysis, gender and length of employment were not. These findings may reflect the relatively homogeneous characteristics of the study population and the limited sample size. Nevertheless, a higher prevalence of LBP was observed among older employees and those with longer employment duration, suggesting cumulative exposure effects.

The results underscore the importance of ergonomic interventions in office-based work environments. Practical strategies such as workstation redesign, posture education, and scheduled micro-breaks may help reduce LBP risk, particularly in resource-limited government office settings.

### **Study Limitation**

This study has several limitations. First, the sample size was relatively small ( $n = 40$ ), resulting in limited statistical power. Second, the cross-sectional design did not allow for causal inferences to be drawn. Third, LBP data were collected via a perception-based questionnaire, which may have introduced information bias.

Nevertheless, this study makes an important contribution by emphasizing that work posture is a key factor in LBP among administrative workers. Further research with a larger sample size, longitudinal design, and evaluation of workplace ergonomic interventions is highly recommended to strengthen the existing evidence.

### **Conclusions**

This study emphasizes that work posture is the most influential factor in the occurrence of low back pain (LBP) among administrative employees at the Bukittinggi City Education and Culture Office. Meanwhile, age, sex, and tenure showed no statistically significant association, although there was a trend of higher LBP prevalence in older age groups, females, and workers with longer tenure. These findings indicate that LBP risk among administrative workers is more influenced by workplace ergonomic conditions than demographic factors.

The practical implications of this study are the need to implement simple ergonomic interventions in office work environments, such as providing chairs and desks that meet standards, adjusting computer monitor positions, and regularly implementing short rest periods for muscle stretching. Education on the importance of maintaining proper body posture is also a preventive measure that can reduce LBP risk. Although this study is limited by a relatively small sample size

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and cross-sectional design, its findings still make an important contribution to the development of occupational health programs.

Further research with a longitudinal design and larger sample size is highly recommended to strengthen the evidence on the association between risk factors and LBP. Additionally, evaluation of the effectiveness of workplace ergonomic interventions particularly in the context of government offices in Indonesia is needed to develop more comprehensive occupational health policy recommendations.

### **Declaration of Conflicting Interest**

The authors declare that there is no conflict of interest regarding the publication of this article.

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