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Original Study

Characteristics of low back pain among nurses at general hospital in Medan: A Cross-sectional Study

Denny Ferdiansyah[1] *, Yoshe Jesslyn[2]
[1]Departemen Ilmu Kedokteran Komunitas Fakultas Kedokteran Universitas Sumatera Utara, Medan, Indonesia
[2]Rumah Sakit Royal Prima Medan,Indonesia

***Corresponding Author:**
Denny Ferdiansyah
Departemen Ilmu Kedokteran Komunitas Fakultas Kedokteran Universitas Sumatera Utara, Medan, Indonesia

Email:
dennyferdian.ferdiansyah@gmail.com

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Abstract

Background
Low back pain (LBP) remains a major occupational health issue, particularly in developing countries like Indonesia, where nurses are frequently exposed to prolonged standing, heavy lifting, and poor ergonomic practices. These conditions contribute to decreased productivity and quality of life.

Objective
This study aimed to examine the characteristics of low back pain among nurses at Royal Prima General Hospital Medan and to assess the relationship between postural risk (REBA scores) and disability level (ODI scores).

Methods
A cross-sectional study was conducted in May 2025, involving 65 nurses selected using proportional stratified random sampling. Data were collected using a demographic questionnaire, the Rapid Entire Body Assessment (REBA) for postural analysis, and the Indonesian version of the Oswestry Disability Index (ODI) to measure disability. Data were analyzed using Spearman correlation and the Mann-Whitney U test.

Results
The mean REBA score was 5.48 ± 2.67, and the mean ODI score was 11.68 ± 13.42. A significant positive correlation was found between REBA and ODI scores ($r = 0.267$, $p = 0.033$), indicating a weak but significant association between poor posture and increased disability. Nurses working ≥8 hours per day had significantly higher ODI and REBA scores ($p < 0.05$). No significant differences were found based on gender, work unit, or length of employment.

Conclusion
Prolonged working hours are associated with increased postural risk and disability levels among nurses. A weak but significant correlation exists between postural risk and low back disability. Early ergonomic interventions and better shift duration management are recommended to reduce the incidence of LBP. To our knowledge, this is one of the first studies in Indonesia utilizing both REBA and ODI among hospital nurses, contributing valuable local evidence to inform occupational health strategies.

Background

Low back pain (LBP) is the most common musculoskeletal disorder worldwide, affecting approximately 60–80% of adults at some point in their lives (World Health Organization, 2023). Beyond its impact on quality of life, LBP is associated with decreased mobility, increased reliance on assistive devices, and high rates of work absenteeism due to pain. It also imposes significant economic and social burdens resulting from reduced productivity and increased healthcare utilization.

In Southeast Asia, the prevalence of LBP among nursing professionals ranges from 55% to 87%, depending on the assessment methods and clinical units involved (Kanchanomai et al., 2019). In Indonesia, LBP is also a critical occupational health concern among healthcare workers. A study conducted at Dr. Sardjito General Hospital in Yogyakarta reported an LBP prevalence of 40.5% among nurses, with 88.9% experiencing pain at the time of survey (Mahmud et al., 2021). Similarly, a local study at the National Brain Center Hospital in Jakarta revealed that 73.3% of inpatient nurses suffered from LBP, primarily due to poor ergonomic practices, and identified a weak but statistically significant correlation between postural risk and pain complaints ($r = 0.258$; $p = 0.023$) (Manurung et al., 2025).

Risk factors for LBP among nurses can be categorized into three main domains: ergonomic factors, such as improper working posture, frequent bending, and repetitive trunk rotation; occupational factors, including extended work hours (≥8 hours per shift), excessive workload, and night shifts that contribute to muscle fatigue; and individual or training-related factors, such as lack of

ergonomic education, infrequent stretching, and limited access to patient lifting equipment.

Previous research has indicated that ergonomic interventions and physical exercise can effectively reduce the risk of LBP. Tinubu et al. (2020) demonstrated that nurses who had not received ergonomic training were more likely to experience LBP. A systematic review and meta-analysis by Indrayani et al. (2024) found that regular physical exercise significantly decreased the incidence of LBP among nurses and nursing assistants. Furthermore, Kore et al. (2021) identified long working hours, improper lifting techniques, and lack of physical activity as significant contributors to LBP among nursing staff.

However, to date, no local studies in Indonesia have specifically examined the relationship between work posture risk using the Rapid Entire Body Assessment (REBA) and functional disability due to LBP using the Oswestry Disability Index (ODI) among nurses. Moreover, no such studies have been conducted at Royal Prima General Hospital Medan, despite the hospital's complex workload and shift-based work system.

This study seeks to provide empirical evidence on nursing ergonomics based on REBA and ODI scores, which may serve as a foundation for developing ergonomic interventions and hospital policy. Therefore, the aim of this study is to describe the characteristics of LBP among nurses at Royal Prima General Hospital Medan, assess the correlation between REBA and ODI scores, and explore the association of these measures with work-related variables such as gender, clinical unit, daily working hours, and length of employment.

Methods

Study Design

This study applied a descriptive-analytic design with a cross-sectional approach, in which data were collected at a single point in time. This design was deemed appropriate to describe the characteristics and assess the relationships among variables without requiring longitudinal observation. It is particularly suitable for active work environments such as hospitals due to its efficiency in time and resource use, even though it does not allow for direct causal inference (Setia, 2016).

Sampling

The study population consisted of all nurses employed at Royal Prima General Hospital Medan in May 2025, totaling 257 individuals. The required sample size was calculated using Slovin's formula with a 10% margin of error, resulting in a sample of 65 respondents. A proportional stratified random sampling technique was used, stratifying participants by unit of assignment, including the Emergency Department (ED), Intensive Care Unit (ICU), Inpatient Wards, and Outpatient Clinics. Inclusion criteria were: nurses actively engaged in direct patient care, having a minimum of one year of work experience, and providing informed consent. Nurses who were pregnant, had a history of musculoskeletal injury or illness, were on leave, or were absent during data collection were excluded from the sample.

Instruments

Three main instruments were used in this study. First, a demographic questionnaire captured respondent characteristics such as age, gender, length of employment, employment status, work unit, working hours, and history of LBP. Second, the Rapid Entire Body Assessment (REBA) tool was employed to evaluate postural risks through direct observation of nurses performing routine clinical activities such as lifting or repositioning patients. Observations were conducted by the principal investigator and a trained assistant over approximately 15 minutes. REBA assesses posture across several body regions—head, trunk, upper arms, lower arms, and wrists—as well as load/force factors. Scores range from 1 to 15 and are interpreted as follows: 1 (very low risk), 2–3 (low risk), 4–7 (medium risk), 8–10 (high risk), and >11 (very high risk) (Schwartz et al., 2025). Third, the Indonesian version of the Oswestry Disability Index (ODI) was used to measure functional disability due to LBP. The ODI contains 10 items, each rated from 0 to 5, with a maximum total score of 50 that is converted into a percentage. Interpretation categories include: 0–20% (minimal), 21–40% (moderate), 41–60% (severe), 61–80% (very severe), and 81–100% (bed-bound or exaggerated symptoms). This instrument has been validated in Indonesia and shows high reliability (Cronbach's alpha = 0.89) (Yusuf et al., 2021; Yazdanirad et al., 2022).

Data Collection

Data collection took place in May 2025 and was conducted during nurses' non-peak hours with prior approval from hospital management. Coordination was carried out with the head nurses to ensure that the research did not disrupt patient care. Each participant was first observed using the REBA tool, followed by self-administered completion of the demographic questionnaire and ODI.

Data Analysis

All data were analyzed using SPSS version 25. Descriptive statistics were used to summarize participant characteristics and the distribution of REBA and ODI scores. Normality of data distribution was assessed using the Shapiro-Wilk test. Since the data were not normally distributed, the Spearman correlation test was used to analyze the relationship between REBA and ODI scores (Nachar, 2022). In addition, non-parametric tests—Mann-Whitney U and Kruskal-Wallis—were applied to examine differences in REBA and ODI scores across categorical variables such as gender, work unit, and length of employment.

Ethical Consideration

This study received ethical approval from the Research Ethics Committee of Universitas Prima Indonesia. All participants provided written informed consent prior to participation. Confidentiality and anonymity were strictly maintained, and all data collected were used solely for academic research purposes.

Results

The majority of respondents were female (95.4%) and most were assigned to inpatient care units. A substantial proportion of participants worked ≥8 hours per day (75.4%) and had less than five years of work experience (50.8%). The mean REBA score among respondents was 5.48 (SD = 2.67), indicating a moderate level of postural risk. Meanwhile, the mean ODI score was 11.68 (SD = 13.42), suggesting that most nurses experienced a mild level of disability due to low back pain.

Spearman's correlation analysis revealed a statistically significant positive correlation between REBA and ODI scores ($p = 0.033$), indicating that higher postural risk was associated with increased levels of disability. Furthermore, independent t-tests showed that nurses working ≥8 hours per day had significantly higher REBA and ODI scores compared to those working less than 8 hours per day ($p = 0.010$ for REBA; $p = 0.003$ for ODI). However, no significant differences in REBA or ODI scores were observed based on gender, length of employment, or unit of work ($p > 0.05$).

Tabel 1. Characteristics of Respondents

Variables	Frequency (n)	Percentage (%)
Gender		
Male	3	4,6
Female	62	95,4
Work Unit		
Emergency departement	7	10,8
ICU	6	9,2
Inpatient ward	43	66,2
Outpatient Clinic	9	13,8
Daily Working Hours		
<8 hours	16	24,6
≥8 hours	49	75,4
Length of Employment		
<5 years	33	50,8
≥5 years	32	49,2

The majority of respondents in this study were female (95.4%) and most were assigned to the inpatient ward (66.2%). A large proportion of respondents also worked ≥8 hours per day (75.4%) and had less than five years of work experience (50.8%) (see Table 1).

Tabel 2. Mean REBA and ODI Scores by Respondent Characteristics

Variables	REBA (mean ± SD)	ODI (mean ± SD)
Gender		
Male	3	4,6
Female	62	95,4
Daily Working Hours		
<8 hours	16	24,6
≥8 hours	49	75,4

*REBA : *Rapid Entire Body Assessment;* ODI : *Oswestry Disability Index*

The mean REBA and ODI scores tended to be higher among female respondents compared to their male counterparts. Nurses who worked ≥8 hours per day had higher REBA and ODI scores than those who worked less than 8 hours per day. Similarly, the REBA score was also higher among respondents with ≥5 years of work experience. In terms of work unit, the highest REBA score was observed among nurses in the Emergency Department (ED), while the highest ODI score was recorded among those working in the Intensive Care Unit (ICU) (see Table 2).

Tabel 3. Mean REBA and ODI Scores by Respondent Characteristics

Relationship/Test	pvalue	Result	Description
Correlation between REBA & ODI (Spearman)	0.033	Significant	Weak positive correlation
ODI vs. Working Hours	0.003	Significant	Higher ODI among those working ≥8 hours
REBA vs. Working Hours	0.010	Significant	Higher REBA among those working ≥8 hours
ODI vs. Gender	0.174	Not Significant	-
REBA vs. Length of Employment	0.121	Not Significant	-
REBA vs. Gender	0.754	Not Significant	-
ODI vs. Length of Employment	0.626	Not Significant	-
REBA vs. Work Unit (ANOVA)	0.076	Not Significant	-

A significant positive correlation was found between REBA and ODI scores (p = 0.033), indicating that higher postural risk is associated with greater levels of disability due to low back pain (LBP). ODI scores were significantly higher among nurses who worked ≥8 hours per day (p = 0.003), and REBA scores were significantly higher among nurses with ≥5 years of work experience (p = 0.036). No significant differences were observed based on gender or work unit.

Discussion

This study demonstrated that high postural risk is associated with an increased level of disability due to low back pain (LBP) among nurses at Royal Prima General Hospital Medan. In addition, working ≥8 hours per day was significantly associated with higher REBA and ODI scores. However, no significant differences were found based on gender, work unit, or length of employment. These findings highlight that work posture and daily work duration are key contributing factors to the occurrence of LBP among nursing personnel.

The significant relationship between REBA and ODI scores indicates that poor working posture has a measurable impact on nurses' physical functioning. Physiologically, non-ergonomic postures may increase mechanical stress on spinal structures, disrupt blood flow to the paraspinal muscles, and trigger inflammation in the supporting soft tissues (Kumar, 2020). When poor posture is maintained repeatedly or for prolonged periods, the risk of mechanical dysfunction and chronic pain increases. This is supported by findings from Indrayani et al. (2024) and Van Hoof et al. (2023), who emphasized that activities such as patient lifting without assistive devices, forward bending, and trunk rotation without proper technique are leading causes of musculoskeletal disorders.

The finding that nurses who work ≥8 hours per day exhibited higher postural risk and disability scores supports the theory of biomechanical

load accumulation. Longer working hours heighten the risk of muscle fatigue, increase intradiscal pressure, and impair tissue recovery (Park et al., 2022; Said and Snober, 2023). Prior studies have also reported that working beyond eight hours increases the likelihood of adopting compensatory postures with higher risk (Tinubu et al., 2020). In the Indonesian hospital context, where the nurse-to-patient ratio remains suboptimal, this phenomenon is further exacerbated.

However, the absence of significant differences in REBA and ODI scores based on gender, unit of work, and length of employment may be influenced by the unbalanced sample composition (only three male respondents) and the limited sample size. This contrasts with findings from Smith et al. (2020), which reported differences in LBP complaints between inpatient wards and ICUs. Such discrepancies may be attributed to variations in study design, measurement methods, and sample size. These findings underscore the need for future research with larger samples and longitudinal designs to strengthen external validity.

This study has several limitations. The cross-sectional design prevents the establishment of causal relationships. REBA observations were conducted only once, and therefore may not capture daily postural variations. Moreover, postural risk assessment relied solely on direct observation without the use of objective tools such as wearable sensors, which may introduce observer bias (Wang et al., 2023).

Despite these limitations, this study provides an important contribution as one of the few local investigations examining the association between REBA and ODI scores in a hospital nursing population. The practical implications of these findings include the urgent need for regular ergonomic training, the provision of patient-lifting aids, and a re-evaluation of extended shift schedules. Implementation of these interventions must take into account the available human resources and institutional support. Several studies have shown that simple posture training programs and job rotation strategies can reduce the incidence of LBP by up to 30% within six months (Kore et al., 2021; Stella et al., 2023; Sabola et al., 2025).

In conclusion, ergonomic interventions are not only essential for individual well-being but also have a direct impact on work efficiency and patient safety. This study is expected to serve as a foundation for future, broader research to support the development of evidence-based ergonomic policies in nursing work environments.

Conclusion and Recommendation

This study concludes that there is a significant association between postural risk scores (REBA) and the level of disability due to low back pain (ODI) among nurses at Royal Prima General Hospital Medan. Nurses who worked ≥8 hours per day had significantly higher REBA and ODI scores compared to those working less than 8 hours, indicating that extended daily work duration contributes to an increased risk of musculoskeletal disorders. These findings support the hypothesis that greater ergonomic risk is associated with a higher likelihood of functional disability due to LBP.

Conversely, the study found no significant associations between REBA and ODI scores with gender, work unit, or length of employment. This suggests that individual and certain environmental workplace factors may be less influential in contributing to LBP risk compared to work duration and posture.

Therefore, these findings underscore the critical importance of ergonomics in nursing practice, particularly in relation to shift length and body posture during patient care activities. As a practical implication, healthcare institutions are encouraged to implement early ergonomic interventions, such as regular posture training programs, provision of patient lifting aids, and the restructuring of work schedules to avoid excessively long shifts. Future research should involve a larger and more gender-balanced sample and adopt a longitudinal design to evaluate the causal and long-term effects of ergonomic interventions.

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The authors declare no competing interests.

Declaration on the Use of AI
No AI tools were used in the preparation of this manuscript.

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