

Physical workload and its relationship with the incidence of low back pain among nurses at Mitra Sehat Hospital

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Abstract

Background: Low Back Pain (LBP) is one of the most common musculoskeletal disorders experienced by nurses due to physically demanding work activities. High physical workload can increase the risk of LBP and affect nurses' health and performance in providing healthcare services.

Method: This study used a quantitative approach with a cross-sectional design. A total of 46 nurses working in the inpatient ward of Mitra Sehat Hospital were included as respondents. The independent variable was physical workload, while the dependent variable was the incidence of LBP. Data were analyzed using the Chi-square test to determine the relationship between physical workload and the incidence of LBP among nurses.

Results: The results showed that most nurses experienced LBP. Nurses with moderate and heavy physical workloads were more likely to experience LBP compared to those with lighter workloads. The Chi-square test showed a p-value of 0.036 ($p < 0.05$), indicating a significant relationship between physical workload and the incidence of LBP.

Conclusion: Physical workload is significantly associated with the incidence of Low Back Pain among nurses. Preventive efforts are needed through workload management and the application of ergonomic principles in the workplace.

Keywords: low back pain; musculoskeletal disorders; nurses; occupational health; physical workload.

INTRODUCTION

Low Back Pain (LBP) is one of the most common musculoskeletal disorders among healthcare workers, particularly nurses in hospital settings (1). The nursing profession involves high job demands, including activities such as lifting, transferring, and repositioning patients, which require considerable physical strength and specific working postures. These activities are often performed repeatedly and over long working hours, thereby increasing the risk of injury to the lower back region (2). Consequently, LBP has become a significant occupational health problem in modern nursing practice (3).

Musculoskeletal disorders represent one of the largest global health problems. Approximately 1.71 billion people worldwide

experience musculoskeletal disorders (4). Low Back Pain is the leading cause of disability globally and is the largest contributor to musculoskeletal disorders (5). In 2020, around 619 million people worldwide were living with Low Back Pain, and this number is projected to increase to 843 million cases by 2050. LBP accounts for approximately 7.4% of total Years Lived with Disability (YLDs) globally. These data indicate that LBP is not only an individual clinical problem but also a global public health issue that significantly affects work productivity and quality of life (5).

Globally, the prevalence of LBP among nurses is relatively high and varies across countries and healthcare facilities (6). Several studies report that the prevalence of

LBP among nurses ranges from 40% to more than 90% throughout their professional careers. This high prevalence reflects the substantial physical burden faced by nursing personnel in providing direct patient care (7). Therefore, LBP has become an occupational health issue that requires serious attention within healthcare systems (8).

Previous studies indicate that manual handling activities, such as lifting or transferring patients, are among the primary factors contributing to LBP among nurses (9). Tasks such as lifting or moving patients frequently involve heavy loads and non-ergonomic body postures. In addition, activities such as pulling patients in bed, assisting with patient mobilization, and transferring patients from bed to chair also increase biomechanical stress on the spine (10). The accumulation of such stress can lead to muscle strain, fatigue, and even chronic musculoskeletal injuries among nurses (11).

Several epidemiological studies have reported that LBP is the most frequently reported musculoskeletal complaint among nursing personnel compared to other body regions (12). A cross-sectional study among nursing staff reported that more than 80% of nurses experienced LBP within the previous year. In addition to affecting individual health, this condition can also influence work productivity and the quality of patient care (13). Therefore, LBP is not only an individual health issue but also an organizational problem within healthcare systems (14).

Physical workload is one of the important determinants contributing to the occurrence of LBP among nurses. Physical workload includes activities such as prolonged standing, bending, twisting, and manually lifting or transferring patients (1). When these activities are performed repeatedly without adequate ergonomic support or assistive devices, the risk of spinal injury increases significantly. Consequently, physical workload is often associated with a high prevalence of musculoskeletal disorders in hospital work environments (9).

In addition to physical activity factors, workplace conditions and organizational

systems may also influence the occurrence of LBP among nurses. The lack of patient lifting equipment, limited workforce availability, and high patient loads often force nurses to perform physically demanding tasks independently (15). The absence of assistive devices can increase biomechanical stress on the spine and accelerate muscle fatigue. Over time, such conditions may increase the risk of occupational injuries and chronic musculoskeletal disorders among nursing personnel (16).

Although many studies have examined the relationship between work activities and LBP among nurses, most of them focus primarily on general ergonomic factors (17). Studies that specifically analyze the relationship between physical workload and the incidence of LBP among nurses within particular healthcare facilities remain limited (18). Furthermore, differences in hospital organizational characteristics, work systems, and service demands may influence the level of risk experienced by nurses. Therefore, contextual research within specific healthcare institutions remains necessary to obtain a more accurate understanding of occupational risks (19).

The novelty of this study lies in its attempt to specifically analyze the relationship between physical workload and the incidence of LBP among nurses within the context of hospital healthcare services. This study not only examines the prevalence of LBP but also evaluates how the intensity of physical activities in nursing work contributes to the occurrence of these complaints. Through this approach, the findings are expected to provide stronger empirical evidence regarding occupational risk factors affecting the musculoskeletal health of nurses. These findings may serve as a basis for developing prevention strategies based on Occupational Health and Safety (OHS) principles.

Research on the relationship between physical workload and LBP among nurses also has important implications for hospital management. Identifying occupational risk factors can assist hospitals in designing preventive interventions, such as improving

workplace ergonomics, utilizing patient lifting devices, and implementing more balanced workload management (20). Such preventive efforts are expected to reduce occupational injuries while improving the well-being of nursing personnel. Consequently, occupational health risk management can be integrated into a safer and more sustainable healthcare system (21).

Based on the above considerations, LBP can be considered a significant occupational health problem in the nursing profession and is closely related to physical workload in nursing practice. The high prevalence of LBP indicates the need for further research on occupational risk factors influencing this condition. Therefore, this study aims to analyze the relationship between physical workload and the incidence of Low Back Pain among nurses at Mitra Sehat Hospital. The findings of this study are expected to contribute scientifically to the development of occupational injury prevention policies for nursing personnel.

METHOD

This study employed a quantitative approach with a cross-sectional design to analyze the relationship between physical workload and the incidence of low back pain among nurses. The study was conducted in the inpatient ward of 'Mitra Sehat' Hospital. The study population consisted of all nurses working in inpatient and outpatient service units, while the research sample was determined using a total sampling technique, including all staff nurses working in the inpatient ward of 'Mitra Sehat' Hospital, totaling 46 nurses.

The research procedures included instrument preparation, validity and reliability testing, data collection through structured questionnaires, as well as data processing and verification. The research instruments consisted of a respondent characteristics questionnaire, an assessment of physical workload based on ergonomic work methods, and the measurement of low back pain complaints using the Nordic Musculoskeletal Questionnaire (NMQ), which has been widely used in occupational health research.

The analysis was conducted using univariate analysis to describe the distribution of respondents' characteristics, while bivariate analysis was performed using the Chi-square test to determine the relationship between physical workload and the incidence of low back pain, with a significance level set at $p < 0.05$.

This study was conducted in accordance with ethical principles for research involving human participants. Ethical approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Manado (Manado Health Polytechnic), Indonesia, under approval number IRB-231-37-2026. Prior to data collection, all respondents were informed about the objectives and procedures of the study, and informed consent was obtained from each respondent. Participation was voluntary, and the confidentiality and anonymity of all respondents were maintained throughout the research process.

RESULTS

1. Respondent Characteristics

The characteristics of the respondents are shown in the table below.

Table 1. Distribution of Respondent Characteristics

Characteristics	Category	Frequency	Percentage
Education	Diploma III in Nursing	24	52.2
	Bachelor of Nursing	18	39.1
	Professional Nurse (Ners)	4	8.7
Gender	Male	16	34.8
	Female	30	65.2
Age	21–30 years	20	48.5
	31–40 years	15	32.6
	41–50 years	8	17.4
	>50 years	3	6.5
Length of Work	<5 years	14	30.4
	5–10 years	18	39.1
	> 10 years	14	30.4

Source: Primary Data (2026)

Table 1 presents the characteristics of the respondents involved in this study. Based on educational level, most respondents held

a Diploma III in Nursing, followed by those with a Bachelor of Nursing degree, while only a small proportion had a professional nurse (Ners) qualification. In terms of gender, the majority of respondents were female, whereas male nurses represented a smaller proportion of the sample. Regarding age distribution, most respondents were in the 21–30 year age group, followed by those aged 31–40 years, while only a few respondents were older than 50 years. Based on work experience, the largest proportion of respondents had 5–10 years of work experience, while respondents with less than 5 years and more than 10 years of work experience were represented in similar proportions.

2. Physical Workload of Nurses

The result of frequency distribution of physical workload among nurses in the inpatient ward of 'Mitra Sehat' Hospital is presented in the table below.

Table 2. Physical Workload of Nurses

Category	Frequency	Percentage
Light	10	21.7
Moderate	21	45.7
Heavy	15	32.6
Total	46	100

Table 2 presents the distribution of physical workload among nurses in the inpatient ward of Mitra Sehat Regional General Hospital. The findings indicate that nearly half of the respondents experienced a moderate level of physical workload, accounting for 21 nurses (45.7%). Meanwhile, 15 nurses (32.6%) were categorized as having a heavy physical workload, while 10 nurses (21.7%) experienced a light physical workload. These results suggest that a considerable proportion of nurses are exposed to moderate to high physical workload during their daily work activities. Such conditions may increase the risk of work-related musculoskeletal problems, particularly among nurses who are frequently involved in physically demanding patient care tasks.

3. Incidence of Low Back Pain

The frequency distribution of Low Back Pain (LBP) incidence is presented in the table below.

Table 3. Incidence of Low Back Pain

Category	Frequency	Percentage
No	17	37.0
Yes	29	63.0
Total	46	100

Table 3 shows that the majority of nurses in the inpatient ward of 'Mitra Sehat' Hospital experienced Low Back Pain (LBP), accounting for 29 respondents (63%), while 17 respondents (37%) did not experience LBP.

Table 4. Cross Tabulation Results for the Relationship Between Physical Workload of Nurses and Incidence of Low Back Pain

Physical Work load	Incidence of Low Back Pain						p Value
	Yes		No		Total		
	n	%	n	%	n	%	0.036
Light	3	30.0	7	70.0	10	100	
Moderate	14	66.7	7	33.3	21	100	
Heavy	12	80.0	3	20.0	15	100	
Total	29	63.0	17	37.0	46	100	

Based on the cross-tabulation results presented in Table 4, out of 46 respondents, the majority of nurses experienced Low Back Pain (LBP), accounting for 29 respondents (63.0%), while 17 respondents (37.0%) did not experience LBP. In the group with a light physical workload, 3 respondents (30.0%) experienced LBP, while 7 respondents (70.0%) did not experience LBP. In the moderate physical workload group, 14 respondents (66.7%) experienced LBP and 7 respondents (33.3%) did not experience LBP. Meanwhile, in the heavy physical workload group, most respondents, namely 12 nurses (80.0%), experienced LBP, while 3 respondents (20.0%) did not experience LBP.

The results of the Chi-square statistical test showed a p-value of 0.036 ($p < 0.05$), indicating a significant relationship between physical workload and the incidence of Low Back Pain among nurses. These findings suggest that higher levels of physical workload are associated with a greater proportion of nurses experiencing Low Back Pain.

DISCUSSION

The findings of this study indicate that the majority of nurses working in the inpatient

ward of 'Mitra Sehat' Hospital experienced complaints of Low Back Pain (LBP). This result confirms that LBP remains a common occupational health problem among nursing personnel. Similar findings have been widely reported in previous international studies, which identify LBP as one of the most prevalent musculoskeletal disorders among healthcare workers, particularly nurses who are involved in direct patient care activities (22). The high occurrence of LBP among nurses is strongly associated with the nature of nursing tasks, which frequently involve physically demanding activities such as lifting, transferring, and repositioning patients. These activities are often performed repeatedly and under time pressure, increasing biomechanical stress on the lumbar spine and consequently elevating the risk of musculoskeletal injury (23).

The present study also revealed that more than half of the respondents reported experiencing LBP. This finding indicates that LBP remains a significant occupational health issue within hospital work environments. Comparable results have been reported in previous studies conducted in various countries. For instance, research conducted in Oman reported that approximately 66.8% of nurses experienced LBP during their work activities (24). The consistently high prevalence reported across different healthcare settings suggests that the physical demands of nursing work remain a global challenge. Therefore, LBP should be considered not only an individual health problem but also an important occupational health concern that requires systematic prevention strategies within healthcare organizations (25).

Regarding the demographic characteristics of respondents, this study found that the majority of nurses were in the young adult age group and predominantly female. This demographic pattern is consistent with the global profile of the nursing workforce, which is largely dominated by women within productive age group (26). Previous research has indicated that approximately 70% of nursing personnel worldwide are female and that the 25–35 year

age group represents the largest proportion of nurses working in hospital settings. These similarities suggest that the characteristics of the study population are relatively comparable with those reported in other nursing workforce studies (27). Although younger nurses are generally considered to have better physical capacity, continuous exposure to physically demanding tasks may still contribute to the development of musculoskeletal problems over time.

This study also identified variation in the length of work experience among respondents, ranging from less than five years to more than ten years. Work experience is an important factor influencing the risk of LBP because prolonged exposure to physically demanding activities may lead to cumulative biomechanical stress on the musculoskeletal system. Previous studies have demonstrated that longer work experience is associated with an increased risk of musculoskeletal disorders, particularly LBP, due to the accumulation of repetitive physical strain on the spinal structure (28). Continuous physical workload over extended periods may contribute to muscle fatigue, reduced spinal stability, and chronic musculoskeletal conditions (29).

Furthermore, the findings of this study showed that most nurses experienced moderate to heavy levels of physical workload. These workloads are associated with routine nursing activities such as lifting and transferring patients, assisting patient mobilization, and maintaining static working postures for prolonged periods (30). Such tasks require considerable physical effort and may lead to increased biomechanical load on the lower back. Previous studies have also demonstrated that work activities involving prolonged static postures, such as standing or bending for long periods, are significantly associated with the occurrence of LBP among nurses. These findings suggest that physical workload represents a critical occupational risk factor contributing to musculoskeletal disorders in nursing practice (31).

The analysis of the relationship between physical workload and the incidence

of LBP in this study revealed a tendency for nurses with higher physical workload levels to experience LBP more frequently. This finding supports the results of previous research indicating that increased work intensity and prolonged exposure to physically demanding tasks significantly elevate the risk of LBP among nurses (25). A previous study reported that each additional hour of daily work could increase the risk of LBP among nurses by approximately 35%. This evidence highlights the importance of managing work intensity and physical workload in order to protect the musculoskeletal health of nursing personnel (32).

In addition to physical workload, ergonomic factors have also been identified as significant contributors to the occurrence of LBP among nurses (33). Activities such as bending, twisting the body, and lifting patients without ergonomic assistive devices can substantially increase biomechanical stress on the lumbar spine (34). Healthcare workers who frequently perform manual handling tasks are known to have a higher risk of developing musculoskeletal disorders compared with many other occupational groups. Therefore, the application of ergonomic principles in nursing practice is considered an essential strategy for reducing the risk of work-related musculoskeletal injuries (35).

Overall, the findings of this study reinforce the growing body of evidence indicating that physical workload plays a significant role in the occurrence of LBP among nurses (36). The high prevalence of LBP observed in this study highlights the urgent need for preventive interventions within healthcare institutions. Such interventions may include improving workplace ergonomics, implementing the use of patient lifting devices, and promoting more balanced workload management systems (37). The adoption of assistive lifting technologies has been shown not only to reduce the risk of occupational injuries but also to improve the well-being, safety, and productivity of nursing personnel. Consequently, strengthening occupational health and safety (OHS) programs within

hospital management systems represents a strategic approach to protecting the health of nurses and ensuring sustainable healthcare services (38).

CONCLUSIONS

Based on the results of this study, it can be concluded that the majority of nurses experienced Low Back Pain (LBP). The analysis showed that the occurrence of LBP tended to be higher among nurses with greater levels of physical workload. Nurses with light physical workload experienced LBP less frequently compared to those with moderate and heavy physical workloads. The statistical analysis also demonstrated a significant relationship between physical workload and the incidence of LBP among nurses in the inpatient ward of Mitra Sehat Regional General Hospital. These findings indicate that higher levels of physical workload are associated with an increased risk of Low Back Pain among nurses.

Hospitals should optimize nurses' workload management, provide ergonomic facilities, and offer training on safe patient handling techniques. Nurses are encouraged to maintain proper working postures, perform regular stretching, and maintain physical fitness to reduce the risk of Low Back Pain.

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