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Prevalence of Low Back Pain and Associated Risk Factors among Nursing and Midwifery Students in Indonesia: A Cross-Sectional Study

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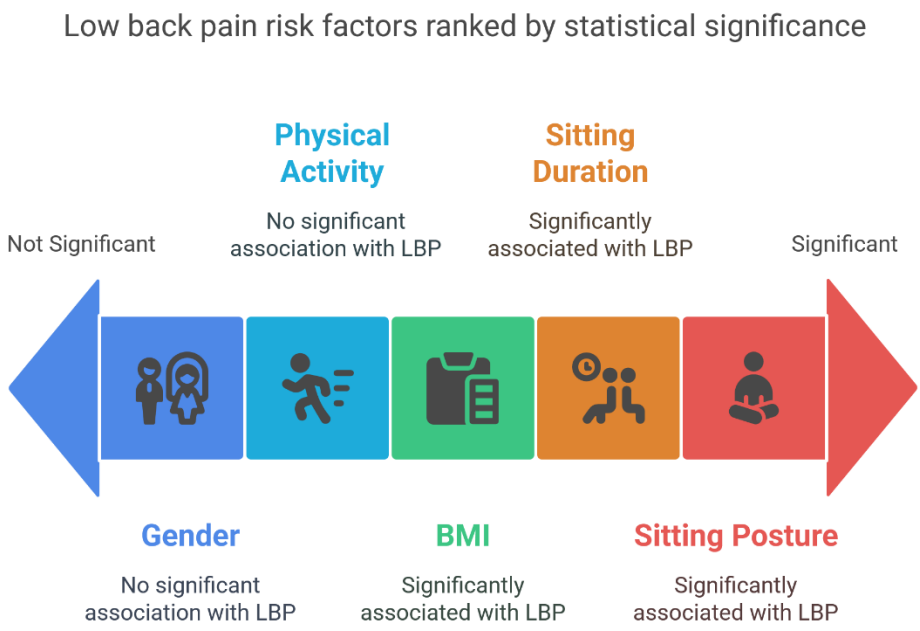
ABSTRACT

Low Back Pain (LBP) commonly affects health science students due to academic and clinical demands, yet remains underreported and insufficiently addressed in educational settings. This study aims to analyze the risk factors associated with low back pain complaints among nursing and midwifery students. A cross-sectional study was conducted involving 126 students from the School of Health Science Al-Ma'arif Baturaja. Total sampling was used. Data were collected using validated questionnaires assessing sitting duration, sitting posture, body mass index (BMI), gender, and physical activity. Data analysis included univariate and bivariate tests. The prevalence of LBP complaints among students was 66.7%. Bivariate analysis showed that BMI (p = 0.029), sitting duration (p = 0.008), and sitting posture (p = 0.003) were significantly associated with LBP. In contrast, gender (p = 0.183) and physical activity (p = 0.117) were not significantly related. Modifiable risk factors such as abnormal BMI, prolonged sitting, and non-ergonomic posture contribute significantly to LBP among students. Gender and activity level were not major predictors in this study. Educational institutions should integrate ergonomic education and preventive health programs into nursing and midwifery curricula to mitigate LBP risks. Early intervention strategies focusing on behavior and posture may enhance student well-being and academic performance.

Key Messages:

- Modifiable ergonomic and behavioral factors—such as prolonged sitting, poor posture, and abnormal BMI are significantly associated with low back pain (LBP) among nursing and midwifery students, highlighting the need for early preventive interventions in academic settings.
- Integrating ergonomic education and musculoskeletal health promotion into nursing and midwifery curricula is essential to reduce the long-term impact of LBP on students' academic performance and future clinical competence.

GRAPHICAL ABSTRACT



INTRODUCTION

Low back pain (LBP) is a common musculoskeletal disorder that affects individuals across various age groups, particularly those in their productive years (1, 2). According to the World Health Organization (WHO), low back pain (LBP) affected approximately 619 million people globally, and this number is projected to rise to 843 million by 2050, largely due to population growth and aging (3). Data from various studies reinforce the significance of this issue. A recent study by in Czech Republic reported that nearly 84,7% of nursing experienced LBP in the past twelve months (4). In Indonesia found that 70% of health students reported similar complaints (5). These high prevalence rates underscore the urgent need to investigate and address LBP in this population. Low back pain (LBP) is a widespread musculoskeletal disorder, particularly prevalent among health science students due to academic and clinical demands. In Saudi Arabia, 94% of health science students reported experiencing LBP (6), while in Malaysia, 71% of nursing students reported similar complaints (7).

In academic settings, students in health-related fields, especially nursing and midwifery, are at increased risk due to prolonged sitting, awkward body positions, and physical activities required during clinical training (8, 9). These students are often exposed to physically demanding environments that require frequent lifting, bending, and standing for long periods (10). As a result, LBP not only impacts physical health but also disrupts academic performance and clinical preparedness. Therefore, LBP has emerged as a critical concern within the student population in health education (11).

Several studies have identified a range of risk factors associated with LBP in nursing and midwifery students (10). These include intrinsic factors such as age, gender, body mass index (BMI), physical fitness, and previous injury history (12-14). Additionally, extrinsic factors such as poor ergonomics, prolonged sitting, carrying heavy backpacks, and non-adjustable classroom furniture contribute significantly (15, 16). Clinical training activities, such as transferring patients or performing procedures at bedside, are also linked to repetitive strain and musculoskeletal stress (17). The lack of ergonomic awareness among students and institutions further increases vulnerability. A combination of these factors may lead to the early onset of chronic LBP symptoms during the academic years. Understanding these risks is essential for prevention and early intervention (18).

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Without proper intervention, students may experience long-term physical limitations that impact both their education and future professional practice (4). Moreover, untreated LBP can lead to absenteeism, reduced participation in clinical rotations, and increased stress levels. The cumulative effect of these problems may jeopardize the quality of health services in the future workforce (19).

Despite the prevalence of LBP, many students fail to recognize its seriousness or seek appropriate care (20). Cultural perceptions that normalize pain as part of clinical training may discourage students from reporting discomfort (21). Furthermore, most academic curricula lack structured education on ergonomics and musculoskeletal health. Students often continue harmful postural habits during study, clinical practice, and daily routines without realizing the consequences (22). Institutions also rarely provide proper ergonomic support in learning environments. As a result, prevention remains a neglected component in student well-being programs. Promoting awareness and proactive strategies could reduce LBP incidence significantly (23).

Currently, interventions for LBP tend to focus on treatment rather than prevention (24). Students experiencing pain are often directed to physiotherapy or given medication without a thorough assessment of the underlying causes (12, 17, 25). A shift toward identifying risk factors and implementing ergonomic education early in training could help mitigate the burden. Incorporating body mechanics training, physical activity promotion, and stress management into the curriculum may offer more sustainable solutions (26). Furthermore, encouraging students to self-monitor their postural habits can foster long-term behavioral change (18). Academic institutions must also evaluate the physical environment to ensure that facilities support healthy musculoskeletal development. Addressing these areas could prevent long-term disabilities and promote better health outcomes (11, 17).

In addition to physical factors, psychological and social elements also play a role in LBP (27). High academic pressure, lack of sleep, emotional stress, and unhealthy coping behaviors such as smoking may lower pain thresholds (28). The biopsychosocial model provides a useful framework for understanding how these interrelated factors contribute to LBP. Psychological distress can exacerbate physical symptoms, leading to a cycle of pain and reduced academic engagement (29). Thus, comprehensive assessments should not only evaluate physical strain but also examine students' mental health and lifestyle habits. Holistic approaches that combine physical, psychological, and environmental interventions are necessary. This model encourages institutions to support students both physically and mentally (30).

LBP can lead to long-term consequences if not managed effectively during the academic period (31). Students with persistent pain may lose motivation, reduce their physical activity, and even change career paths due to their health limitations (32). In extreme cases, chronic pain conditions developed during university years can carry over into professional practice, reducing their ability to function as competent caregivers (33). This may ultimately contribute to a decline in workforce quality and healthcare delivery (34). Therefore, the impact of LBP goes beyond the individual, affecting broader public health systems. Preventive strategies are essential to maintain the well-being and productivity of future healthcare professionals (35).

Given the high prevalence and multifactorial nature of LBP among nursing and midwifery students, this study aims to analyze the risk factors that contribute to low back pain complaints in nursing and midwifery students.

METHODS

This study employed a quantitative approach with a cross-sectional design, which was selected to analyze the relationship between multiple risk factors and the presence of low back pain (LBP) at a single point in time. The cross-sectional design was considered appropriate as the aim of the research was to identify and assess potential risk factors such as sitting duration, sitting posture, gender, body mass index (BMI), and physical activity that may contribute to LBP complaints among nursing and midwifery students. The research was conducted at School of Health Science Alma'arif, a health science higher education institution, from February 10 to April 14, 2025.

The study population consisted of all 126 nursing and midwifery students enrolled at the institution, including 71 nursing students and 55 midwifery students. A total sampling technique was

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applied to ensure complete population inclusion. Total sampling was selected because the total number of students was manageable and allowed the researcher to include the entire population that met the inclusion criteria. Inclusion criteria were active enrollment in the program, willingness to participate, and completion of informed consent. Students who were on medical leave or had known musculoskeletal disorders unrelated to LBP were excluded.

Data collection involved the use of structured questionnaires that had been previously tested for validity and reliability. The independent variables included: (1) sitting duration, measured using a 3-item Likert-scale-based questionnaire with score categories: short (3–7), moderate (8–11), and long (12–15); the instrument had a Cronbach's alpha of 0.665 and r-count > 0.361 indicating good reliability and validity (36); (2) sitting posture, assessed using a 10-item Likert-scale-based questionnaire with both positive and negative items, categorized into non-ergonomic (10–23), less ergonomic (24–37), and ergonomic (38–50); with a Cronbach's alpha of 0.704 and r-count > 0.361 (36); (3) gender, categorized as male and female; (4) BMI, categorized as underweight, normal, overweight, and obese; and (5) physical activity, measured using the International Physical Activity Questionnaire (IPAQ) short form, with validated reliability (Cronbach's alpha = 0.780) (37). The dependent variable was LBP complaint, measured using the Nordic Musculoskeletal Questionnaire (NMQ) which consisted of 8 yes/no items and had high validity and reliability (r-count > 0.514, Cronbach's alpha = 0.810) (37).

Data were analyzed using univariate and bivariate statistics. Univariate analysis was conducted to describe the frequency distribution of each variable, including demographic characteristics and the level of exposure to risk factors. Bivariate analysis was used to examine the relationship between each independent variable and LBP complaints, with statistical significance assessed using appropriate tests based on the type and distribution of the data. All analyses were conducted using SPSS.

Participation was entirely voluntary, and students were informed about the study's purpose, procedures, potential risks, and benefits. Informed consent was obtained in writing from each participant, ensuring that respondents had the freedom to withdraw at any time without academic or personal consequences. Confidentiality of the participants was strictly maintained throughout the study, and all responses were anonymized for analysis and reporting. The researchers adhered to the principles of ethical research conduct, including respect for autonomy, beneficence, non-maleficence, and justice.

RESULTS

Univariate analysis was conducted to describe the characteristics of the respondents and the distribution of each research variable. This analysis aimed to present a frequency distribution of sitting duration, sitting posture, gender, body mass index (BMI), and physical activity, and LBP complaints. The data were tabulated to show both the frequency (n) and percentage (%) of each category, there by providing an overview of the population's exposure to the identified risk factors. The detailed results of this analysis are presented in Table 1.

Table 1. Frequency Distribution of Respondents Based on Gender, Body Mass Index, Physical Activity, Sitting Duration, Sitting Posture, and Low Back Pain Complaints (n = 126)

Variable	n	%
Gender		
Male	18	14.3
Female	108	85.7
Body Mass Index (BMI)		
Underweight	15	11.9
Normal	67	53.2
Overweight	33	26.2
Obese	11	8.7
Physical Activity		
Light	41	32.5
Moderate	61	48.4

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Variable	n	%
Vigorous	24	19.1
Sitting Duration		
Short	27	21.4
Moderate	46	36.5
Long	53	42.1
Sitting Posture		
Non-ergonomic	38	30.2
Less ergonomic	55	43.7
Ergonomic	33	26.2
Low Back Pain Complaint		
No complaint	42	33.3
With complaint	84	66.7

As shown in Table 1, the univariate analysis showed that the majority of respondents were female (85.7%), while male respondents comprised only 14.3%. Most students had a normal body mass index (53.2%), followed by those who were overweight (26.2%), underweight (11.9%), and obese (8.7%). Regarding physical activity, nearly half of the students (48.4%) engaged in moderate levels of activity, while 32.5% reported light physical activity, and only 19.1% performed vigorous activities. In terms of sitting duration, a substantial portion of respondents (42.1%) reported long sitting periods, 36.5% had moderate sitting time, and only 21.4% reported short sitting durations. Related to sitting posture, 43.7% of students were classified as having less ergonomic posture, 30.2% as non-ergonomic, and only 26.2% demonstrated ergonomic sitting behavior. Lastly, the data revealed that 66.7% of students reported experiencing low back pain, while 33.3% did not report any complaints.

Table 2. Bivariate Analysis of Risk Factors Associated with Low Back Pain Complaints (n = 126)

Variable	Low Back Pain Complaint				Total		p-value
	With complaint		No complaint				
	n	%	n	%	n	%	
Gender							
Male	13	72.2	5	27.8	18	100	0.183
Female	71	64.5	39	35.5	108	100	
Body Mass Index (BMI)							
Underweight	13	86.7	2	13.3	15	100	0.029
Normal	40	59.7	27	40.3	67	100	
Overweight	23	69.7	10	30.3	33	100	
Obese	8	72.7	3	27.3	11	100	
Physical Activity							
Light	26	63.4	15	36.6	41	100	0.117
Moderate	35	57.4	26	42.6	61	100	
Vigorous	13	54.2	11	45.8	24	100	
Sitting Duration							
Short	14	51.9	13	48.1	27	100	0.008
Moderate	24	52.5	22	47.8	46	100	
Long	46	86.8	7	13.2	53	100	
Sitting Posture							
Non-ergonomic	30	78.9	8	21.1	38	100	0.003
Less ergonomic	31	56.4	24	43.6	55	100	
Ergonomic	23	48.9	24	51.1	33	100	

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As shown in Table 2, several variables were significantly associated with low back pain (LBP) complaints. Body mass index (p = 0.029), sitting duration (p = 0.008), and sitting posture (p = 0.003) showed significant relationships with LBP. Students who were underweight or obese, sat for long durations, and had non-ergonomic posture were more likely to report LBP. In contrast, gender (p = 0.183) and physical activity (p = 0.117) did not show a statistically significant association. These findings indicate that modifiable behavioral and ergonomic factors play a more prominent role in LBP risk among students than activity level alone.

DISCUSSION

This study revealed that a substantial proportion of nursing and midwifery students (66.7%) reported experiencing LBP. The bivariate analysis showed significant associations between LBP complaints and several risk factors, including body mass index (BMI), sitting duration, and sitting posture. However, gender and physical activity were not significantly associated with LBP. These findings suggest that ergonomic and behavioral factors play a more crucial role in the development of LBP among health science students compared to physical activity alone. Nursing and midwifery students are known to engage in prolonged sitting during lectures and academic tasks, and often assume poor postural habits. These repetitive musculoskeletal stressors likely contribute to early-onset LBP. As such, integrating ergonomic education into the curriculum and promoting awareness of healthy posture should be considered essential components of preventive health strategies for health professional students.

The study found no statistically significant association between gender and LBP complaints among students. This finding contrasts with Abdu, Beda (5) which reported higher LBP prevalence in females due to hormonal and psychosocial factors. It is also possible that both male and female students were similarly exposed to ergonomic risks in academic and clinical settings. This finding is consistent with a study by Paganini, Murni (38), which also reported no significant association between gender and low back pain among university students. Gender-related differences in pain perception or reporting behavior may exist but were not strongly reflected in this sample. Therefore, interventions should focus on modifiable behavioral risks rather than gender-specific strategies.

The analysis also showed a significant association between BMI and LBP. This is consistent with findings from research by Abdu, Beda (5) who noted that both extremes of BMI are linked to increased spinal stress and reduced musculoskeletal stability. Underweight individuals may have inadequate muscle mass to support the spine, while excess weight increases mechanical load on the lumbar region. The physiological strain caused by abnormal BMI can compromise spinal alignment and increase susceptibility to chronic pain (39). Moreover, students with unhealthy BMI levels may engage in sedentary lifestyles, further exacerbating the problem. These findings align with the theoretical framework that links biomechanical loading and musculoskeletal health (40). From the researchers' perspective, BMI should be regularly monitored in academic health settings, and students should be supported through balanced nutrition and structured physical activity programs to prevent LBP.

Sitting duration was significantly related to LBP complaints, with longer sitting times associated with a higher prevalence of pain. This supports previous studies by Amin, Muchsin (41) which identified prolonged static sitting as a major contributor to lower back discomfort in young adults. Extended sitting leads to increased pressure on intervertebral discs and reduced blood flow to spinal tissues, which over time can cause stiffness and pain (31). Students who sit for long hours during lectures, assignments, or screen-based learning are particularly vulnerable. This behavior is often reinforced by academic demands and lack of awareness regarding the need for postural variation or breaks (42). The theoretical model of cumulative loading also explains how continuous low-level stress on the spine leads to microtrauma and pain. Based on the data, the researchers emphasize the importance of encouraging students to incorporate movement into daily routines and take regular breaks to prevent LBP onset (5).

Another significant finding was the association between sitting posture and LBP with non-ergonomic and less ergonomic postures significantly increasing the likelihood of pain. This aligns with studies by Kusumaningrum, Samara (40) who demonstrated that poor postural alignment during sitting leads to asymmetrical loading of spinal structures and muscle fatigue. Improper posture, such as slouching

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or leaning forward, causes biomechanical strain that can accumulate over time (31). Students often adopt such postures unconsciously due to inadequate seating, stress, or habit (12). Theoretically, sustained non-ergonomic positions disrupt spinal curvature and muscle balance, contributing to musculoskeletal pain. Ergonomic posture supports natural spinal alignment and helps reduce muscle strain during long sitting periods (4). In light of these findings, the researchers advocate for ergonomic education and improved classroom environments as preventive strategies for LBP in academic settings.

Despite the valuable insights gained, this study has several limitations. The sample was limited to one institution, which may affect the generalizability of findings to other health education settings. Future research should consider multi-institutional studies to enhance the external validity of the findings. The study highlights critical ergonomic and behavioral risks relevant to the student population. These findings underscore the importance of incorporating musculoskeletal health promotion into nursing and midwifery education. By addressing LBP risk early, health education programs can help cultivate a workforce that is physically resilient and prepared to provide safe patient care. The results of this study contribute to strengthening preventive health education in academic nursing and midwifery programs.

CONCLUSION

This study concluded that low back pain (LBP) is a prevalent musculoskeletal complaint among nursing and midwifery students, affecting 66.7% of the respondents. Bivariate analysis identified that BMI, sitting duration, and sitting posture were significantly associated with LBP complaints, while gender and physical activity was not. Students with abnormal BMI (underweight or obese), prolonged sitting habits, and non-ergonomic sitting posture were more likely to experience LBP. These findings highlight the importance of modifiable ergonomic and behavioral factors as key contributors to LBP in the academic setting. Addressing these factors early during professional education may help reduce the risk of chronic musculoskeletal issues and improve students' academic performance and clinical readiness.

The findings underscore the critical need for academic institutions to integrate comprehensive ergonomic education and musculoskeletal health promotion programs into nursing and midwifery curricula. This should include practical training on proper body mechanics during patient care, guidance on optimizing sitting postures for prolonged study, and regular promotion of physical activity breaks. Furthermore, institutions should actively evaluate and improve the ergonomic design of learning environments such as classrooms, laboratories, and clinical training sites to support healthy musculoskeletal development. Embedding these strategies will not only reduce LBP risks among students but also cultivate a culture of preventive health and physical resilience essential for future healthcare professionals.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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