

The Relationship Between Functional Activity Of Low Back Pain And Sedentary Lifestyle In Students

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ABSTRACT

Introduction: Lower back pain among college students is a growing musculoskeletal problem resulting from academic activities that are often sedentary. Prolonged sitting, continuous use of laptops and electronic devices, and low levels of physical activity increase biomechanical stress on the lumbar vertebrae, thereby triggering functional impairments. This study aims to analyze the relationship between functional activity and lower back pain with sedentary lifestyle behaviors among students at ITSK RS dr. Soepraoen Malang. **Methods:** The study employed a quantitative, correlational analytical design with a cross-sectional approach. A sample of 80 students was selected using purposive sampling. Sedentary lifestyle was measured using the Sedentary Behavior Questionnaire (SBQ), pain levels using The Pain and Distress Questionnaire, and functional activity using the Oswestry Disability Index (ODI). Data analysis employed the Spearman Rank test with a significance level of 0.05. **Results:** The results indicated that the majority of respondents had a moderate level of sedentary lifestyle (30 respondents, 37.5%), mild pain complaints (35 respondents, 43.8%), and minimal disability (30 respondents, 37.5%). The results of the Spearman's rank correlation test showed a p-value = 0.01 ($p < 0.05$) with a correlation coefficient of 0.862, indicating a very strong and positive relationship. **Conclusion:** The higher the level of sedentary behavior, the greater the limitations in functional activity due to low back pain. This study confirms that a sedentary lifestyle is a significant risk factor for musculoskeletal disorders among college students, thus necessitating ergonomics education and increased physical activity.

Keywords: low back pain, sedentary lifestyle, college students, functional activity, physical therapy

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INTRODUCTION

Low back pain (LBP) is one of the most prevalent musculoskeletal disorders worldwide and a leading cause of activity limitation and disability. The Global Burden of Disease Study reported that LBP remains a leading contributor to years lived with disability and is projected to increase globally by 2050 (GBD 2021 Low Back Pain Collaborators, 2023). This condition may affect students' quality of life, academic productivity, and ability to perform daily activities.

Students are a group vulnerable to LBP because academic activities are commonly performed in a sedentary position. Prolonged sitting during study sessions, continuous use of laptops and gadgets, and limited physical activity

may increase static loading on the lumbar region. These conditions are associated with paraspinal muscle tension, reduced spinal mobility, and musculoskeletal discomfort (Kusumaningrum et al., 2021). International evidence among college students also shows that LBP is frequently associated with lifestyle behaviors, including prolonged sitting and low physical activity (Alshehri et al., 2023).

Physiologically, prolonged sedentary behavior may cause sustained static contraction of the paraspinal and core muscles, reduce local blood circulation, increase muscle fatigue, and elevate mechanical pressure on spinal structures. These mechanisms can stimulate nociceptors and contribute to lower back discomfort, especially when sitting is maintained without posture



variation or stretching. However, these mechanisms should be interpreted as plausible physiological explanations rather than as direct causal evidence, given the study's cross-sectional design.

Recent studies indicate that sedentary behavior is associated with musculoskeletal complaints and functional limitation, although the strength and direction of the relationship may differ across populations and study designs. Mahdavi et al. (2021) reported that sedentary behavior was associated with a moderate increase in LBP risk, while Alzahrani et al. (2022) found that sedentary behavior of three hours or more per day was associated with worse LBP-related disability. Montgomery et al. (2024) further emphasized that the causal role of sedentary behavior in spinal pain among children and adolescents remains uncertain, highlighting the importance of interpreting correlation findings carefully.

However, most previous studies have focused primarily on the prevalence of lower back pain or general sitting duration without specifically assessing functional activity limitations using physical therapy instruments such as the Oswestry Disability Index (ODI). Furthermore, research on health science students in Indonesia remains relatively limited, even though this group faces high academic demands and engages in more sedentary activities compared to other student groups. Existing studies have largely focused on sedentary behavior or lower back pain independently, while evidence exploring their relationship with functional activity among health science students remains limited. This lack of evidence represents an important research gap that warrants further investigation.

This study combined measurements of sedentary behavior, pain levels, and functional activity using three standardized instruments: the Sedentary Behavior Questionnaire (SBQ), the Pain and Distress Questionnaire, and the Oswestry Disability Index (ODI). This study not only assesses the incidence of lower back pain but also analyzes its impact on students' functional activity, thereby providing a more comprehensive

picture of musculoskeletal disorders in the productive age group.

The present study sought to determine the relationship between sedentary behavior, low back pain, and functional activity among students at ITSK RS dr. Soepraoen Malang. The findings may serve as a scientific basis for developing evidence-based physiotherapy programs focused on health promotion and prevention through ergonomic education, interruption of prolonged sitting, and regular physical activity to mitigate musculoskeletal complaints.

METHODS

A quantitative study employing an analytical correlational design with a cross-sectional framework was conducted at ITSK RS dr. Soepraoen Malang in 2026. The study population consisted of active students at the institution. Eighty eligible participants were selected through purposive sampling based on the established inclusion and exclusion criteria.

Inclusion criteria comprised active students aged 20–21 years who voluntarily agreed to participate, were able to complete self-administered questionnaires, and had academic routines characterized by prolonged sitting. The exclusion criteria were students with a history of spinal surgery, diagnosed neurological disorders, acute traumatic injury, congenital spinal deformity, pregnancy, or ongoing medical treatment for severe low back pain at the time of data collection.

The independent variable in this study was sedentary lifestyle, while the dependent variables were low back pain complaints and functional activity. Sedentary lifestyle was measured using the Sedentary Behavior Questionnaire (SBQ), pain level using the Pain and Distress Questionnaire, and functional activity using the Oswestry Disability Index (ODI). To standardize the presentation of categories, SBQ was reported as low, moderate, and high sedentary behavior; Pain and Distress was reported as normal, mild, and higher pain score; and ODI was reported as minimal, mild, and moderate disability.

Data collection was conducted by distributing questionnaires directly to respondents after obtaining informed consent.



Statistical analysis included univariate analysis to summarize participant characteristics and bivariate analysis to assess the relationship between the study variables. Spearman's rank correlation coefficient was applied because the data were ordinal and failed to satisfy the normality assumption. The correlation results were interpreted as statistical associations and not as evidence of a causal relationship. This study received ethical approval from the ITSK RS dr. Soepraoen Ethics Committee under number KEPK-EC/580/IV/2026.

RESULTS

Based on the results of a study conducted by the researcher from March 24 to April 24, 2026, at ITSK RS dr. Soepraoen in Malang. The study involved 80 student respondents.

Table 1. Characteristics of Participants

Groups	Category	Frequency	N%
Age (yr)	20	40	50
	21	40	50
Gender	Male	20	20
	Female	60	80

Table 1 shows that the respondents' age range was 20–21 years, comprising 40 respondents (50%). In terms of gender, the majority of respondents were female, comprising 60 students (80%), while only 20 respondents (20%) were male.

Table 2. Sedentary Behavior Questionnaire (SBQ)

Sedentary Behavior Questionnaire (SBQ)	Frequency	%
Light	25	31,3
Medium	30	37,5
High	25	31,3
Amount	80	100

According to Table 2, the SBQ analysis showed that most respondents had a moderate sedentary lifestyle, with 30 respondents (37.5%). Meanwhile, the low and high categories each consisted of 25 respondents (31.3%).

Table 3. Pain and Distress Questionnaire

Pain and Distress Questionnaire	Frequency	%
Light	23	28,8
Medium	35	43,8
High	22	27,5
Amount	80	100

The results of the frequency distribution analysis of the Pain and Distress variable showed that 35 respondents (43.8%) were in the mild pain category, 23 respondents (28.8%) were in the normal category, and 22 respondents (27.5%) were in the higher pain score category. These results indicate that most respondents reported mild lower back pain complaints.

Table 4. Oswestry Disability Index (ODI)

Oswestry Disability Index (ODI)	Frequency	%
Light	30	37,5
Medium	27	33,8
High	23	28,8
Amount	80	100

Based on the ODI analysis, 30 respondents (37.5%) were categorized as having minimal disability, 27 respondents (33.8%) had mild disability, and 23 respondents (28.8%) had moderate disability. These results indicate that most respondents had minimal functional limitations related to low back pain.

Table 5. Spearman Rank Correlation between SBQ, Pain and Distress, and ODI

Questionnaire	(r)	Sig.
SBQ with Pain Disorder	0.907	0.000
SBQ with ODI	0.862	0.000
Pain Disorder with ODI	0.802	0.000

Table 5 shows the Spearman rank correlation test among the study variables. The correlation between SBQ and Pain and Distress was $r = 0.907$ ($p < 0.001$), the correlation between SBQ and ODI was $r = 0.862$ ($p < 0.001$), and the correlation between Pain and Distress and ODI was $r = 0.802$ ($p < 0.001$). These findings indicate that higher sedentary behavior was associated



with higher pain scores and greater functional limitations. However, because this study used a cross-sectional design, the results should be interpreted as correlation and not as evidence of a cause-and-effect relationship.

DISCUSSION

Based on Table 1, the distribution of respondents by age showed equal numbers in the 20- and 21-year-old age groups, namely 40 respondents (50%). This age group falls within the early adulthood phase, characterized by high academic activity and long study hours. This age group may be a factor associated with the risk of lower back pain among college students due to prolonged sitting habits resulting from a demanding academic schedule (Abdu et al., 2022).

Students in the early adulthood age group tend to experience musculoskeletal complaints due to prolonged static activities. Non-ergonomic sitting and a lack of stretching can cause pressure on the lumbar region, triggering lower back pain (Pratami et al., 2020).

Based on Table 1, the distribution of respondents by gender shows that the majority of respondents were female, totaling 60 respondents (80%), while male respondents numbered 20 (20%). This predominance of female respondents aligns with research conducted by Mayzar et al. (2020) among students in the Faculty of Health Sciences at Muhammadiyah University of Surabaya.

This phenomenon can be explained through a gender perspective in health education, which tends to be associated with female roles and characteristics such as caring and empathy. Additionally, male students tend to face fewer social challenges that affect motivation and learning experiences in the health field compared to women (Setiawan et al., 2020).

Based on the research results in Table 2, most respondents were in the moderate sedentary lifestyle category, totaling 30 respondents (37.5%). The low and high categories each consisted of 25 respondents (31.3%). These findings indicate that many students had sedentary behavior related to academic activities and prolonged sitting during the learning process.

Such patterns are commonly found among students with demanding academic schedules (Siprianus Abdu et al., 2022).

Additionally, a study conducted by Amelia et al. (2022) showed that students during academic activities exhibit a tendency toward sedentary behavior due to low daily physical activity. The study stated that prolonged sitting and a lack of physical activity caused some respondents to fall into the moderate category.

A similar study was conducted by Adibah et al. (2023) with 98 medical students at the University of Muslim Indonesia to examine the relationship between physical activity and sedentary lifestyle. The results showed that some respondents had a fairly high level of sedentary behavior due to academic activities and prolonged laptop use. The findings indicate that students are a group vulnerable to a sedentary lifestyle, with levels ranging from moderate to high.

Based on the research results presented in Table 3, most respondents were classified in the mild pain category, with 35 respondents (43.8%). Meanwhile, 23 respondents (28.8%) were in the normal category, and 22 respondents (27.5%) were classified in the higher pain score category based on the questionnaire score. These findings indicate that lower back discomfort was present among some respondents, although the majority experienced it at a mild level.

The classification of pain in this study refers to the respondents' self-reported pain perception at the time of data collection and should not be interpreted as a direct clinical diagnosis of severe pathological back pain (Hartvigsen et al., 2018). In young adult students, higher pain scores may reflect temporary discomfort, accumulated musculoskeletal strain, fatigue, or pain provoked by prolonged sitting and academic activities. This condition may occur due to sedentary behavior, long study duration, and non-ergonomic sitting posture during the learning process. Maintaining a non-ergonomic sitting position for an extended period can increase mechanical stress on the lower back and may contribute to lower back pain complaints (Pratami et al., 2019).

The results of this study are in line with research conducted by Fadlyansyah et al. (2023)



among students at the Faculty of Medicine, Hasanuddin University, involving 160 respondents. Their study reported that 120 respondents (75%) experienced moderate lower back pain, but the complaints did not yet interfere significantly with functional activities. This supports the assumption that lower back pain among students is commonly associated with academic routines, especially prolonged sitting, rather than necessarily indicating a severe clinical condition. Therefore, the presence of respondents with higher pain scores in this study should be understood as an indication of increased perceived discomfort that requires preventive attention, ergonomic education, and early musculoskeletal health promotion.

Based on Table 4, most respondents were in the minimal disability category, namely 30 respondents (37.5%). In addition, 27 respondents (33.8%) were in the mild disability category, and 23 respondents (28.8%) were in the moderate disability category. These findings indicate that the majority of respondents still had relatively good functional capacity, although some respondents had functional limitations that require preventive attention.

Functional disability among students may be associated with low physical activity, prolonged sitting, and limited posture variation during academic activities. Prolonged sitting can increase mechanical load on spinal structures and contribute to muscle tension and restricted movement. International evidence also shows that sedentary behavior may be associated with LBP-related disability, although causality remains uncertain (Alzahrani et al., 2022; Montgomery et al., 2024).

The results of this study are consistent with the research conducted by Arni Isnaini et al. (2021) among students at the Faculty of Medicine, Universitas Muslim Indonesia, which involved 147 respondents. The results showed that 29 respondents fell into the mild category, while the majority experienced moderate disability. The researchers explained that among this group of students, pain complaints generally did not yet lead to severe activity limitations

because their physical functional capacity remained fairly good.

Based on the study, the correlation between SBQ and ODI was $r = 0.862$ with $p < 0.001$. These results indicate a very strong positive correlation between sedentary lifestyle and functional activity limitations related to low back pain among college students. In other words, higher sedentary behavior tended to be accompanied by greater functional limitations. However, this finding should be interpreted as an association, not as proof that sedentary behavior directly causes functional limitations.

The results of a study conducted by Abdu et al. (2022) also identified prolonged sitting duration, low physical activity, and sedentary behavior as factors associated with low back pain complaints in students. Similarly, Mahdavi et al. (2021) reported that sedentary behavior in work or leisure time was associated with an increased likelihood of LBP in adults, children, and adolescents.

The correlation between SBQ and Pain and Distress yielded $r = 0.907$ with $p < 0.001$, indicating a very strong positive association. This result suggests that students with higher sedentary behavior tended to report higher pain scores. Nevertheless, the Pain and Distress score reflects self-reported pain perception at the time of data collection and does not represent a clinical diagnosis of severe pathological back pain. Therefore, the results should be used as a basis for preventive education and early musculoskeletal health promotion rather than as clinical diagnostic evidence.

This study has inherent limitations that should be acknowledged. The cross-sectional design limits the ability to infer causality between sedentary behavior, lower back pain, and functional activity. Additionally, the use of self-reported measures may have introduced recall and reporting bias. The inclusion of participants from a single academic institution may also restrict the generalizability of the results. Future studies should recruit more diverse populations, utilize objective assessments of sedentary behavior, and apply longitudinal or prospective designs to strengthen the evidence.



CONCLUSION

Sedentary lifestyle was significantly correlated with low back pain complaints and functional activity limitations among students at ITSK RS dr. Soepraoen Malang. Higher sedentary behavior was associated with higher Pain and Distress scores and greater ODI-based disability levels. These findings support the importance of ergonomic education, posture variation, movement breaks, and regular physical activity as preventive strategies for student musculoskeletal health.

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