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THE EFFECT OF STRETCHING ON LOW BACK PAIN INTENSITY IN MEDICAL STUDENTS OF PRIMA INDONESIA UNIVERSITY IN 2022

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Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh latihan peregangan terhadap intensitas nyeri punggung bawah pada mahasiswa Fakultas Kedokteran Universitas Prima Indonesia pada tahun 2022. Latar belakang penelitian ini didasarkan pada prevalensi yang tinggi dari nyeri punggung bawah di kalangan mahasiswa akibat gaya hidup sedentari dan postur duduk yang tidak ergonomis. Penelitian ini menggunakan metode kuantitatif dengan desain quasi-eksperimental satu kelompok pra-tes dan pasca-tes. Populasi penelitian terdiri dari 199 mahasiswa, dengan sampel 67 responden yang dipilih melalui sampling acak. Alat penelitian berupa kuesioner terstruktur, dan intensitas nyeri diukur menggunakan Skala Penilaian Numerik (NRS). Analisis data dilakukan secara deskriptif dan inferensial menggunakan uji Wilcoxon. Hasil menunjukkan penurunan signifikan pada rata-rata intensitas nyeri dari 3,37 menjadi 1,12 setelah intervensi peregangan ($p < 0,001$). Kesimpulan studi ini adalah bahwa latihan peregangan terstruktur dan rutin efektif dalam mengurangi intensitas nyeri punggung bawah pada mahasiswa, sehingga dapat direkomendasikan sebagai strategi untuk mencegah dan mengelola nyeri punggung bawah di lingkungan pendidikan tinggi.

Kata Kunci: *Nyeri Punggung Bawah, Mahasiswa Kedokteran, Skala Penilaian Numerik, Latihan Peregangan, Uji Wilcoxon*

Abstract

This study aims to analyze the effect of stretching exercises on the intensity of low back pain among medical students at Universitas Prima Indonesia in 2022. The research background is based on the high prevalence of low back pain among students due to sedentary lifestyles and non-ergonomic sitting postures. A quantitative method with a quasi-experimental one group pretest posttest design was employed. The study population consisted of 199 students, with 67 respondents selected using random sampling. The research instruments included a structured questionnaire and pain intensity measurement using the Numeric Rating Scale (NRS). Data analysis was performed using descriptive and inferential statistics with the Wilcoxon test. The results showed a significant decrease in the mean pain intensity from 3.37 to 1.12 after the stretching intervention ($p < 0.001$). The conclusion is that structured and routine stretching exercises are effective in reducing low back pain intensity among medical students, and can be recommended as a preventive and management strategy for low back pain in higher education settings.

***Keywords*:** *Low Back Pain, Medical Students, Numeric Rating Scale, Stretching Exercise, Wilcoxon Test*

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INTRODUCTION

Research Phenomenon

Low back pain has become a significant global health problem, affecting millions of individuals worldwide. According to the World Health Organization (WHO), hundreds of millions of people suffer from 150 different types of musculoskeletal problems, which can cause pain, disability, and functional limitations, impacting social and psychological issues. Data from the Global Burden of Disease Study shows a dramatic increase in the incidence of low back pain, from 377.5 million in 1990 to 577 million in 2017. Recent research by Konrad et al. (2025) revealed that stretching can reduce pain by increasing range of motion and reducing muscle stiffness. Consistent with these findings, a meta-analysis by Cheng et al. (2025) showed that all exercise therapies, including stretching, effectively reduce low back pain.

The prevalence of low back pain shows significant geographic variation, with South Latin America recording the highest prevalence (13.47%), followed by Asia Pacific (13.16%), while the lowest prevalence was found in East Asia (3.92%). In Indonesia, based on the results of the Basic Health Research in 2018, the prevalence of musculoskeletal diseases diagnosed by health workers reached 11.9% with symptoms of 24.7%, and the estimated prevalence of low back pain ranges from 7.6% to 37%. A recent study by Awad et al. (2025) in Palestinian students showed a prevalence of low back pain of 52%. The study of Pathiati et al. (2025) in nursing students in Indonesia also confirmed the high prevalence of muscle pain due to prolonged activity.

Research Problems

A sedentary lifestyle and prolonged sitting posture have been identified as major risk factors for low back pain, particularly in the college student population. A comprehensive meta-analysis by Mahdavi et al. (2021) showed that sedentary behavior, both at work and during leisure time, is associated with a 24% increased risk of low back pain in adults and a 41% increased risk in children and adolescents. Research by Montgomery et al. (2025) emphasized that prolonged sitting, poor sitting posture, and lack of rest are associated with low back pain. A recent study of Indonesian college students by researchers at Ibnu Sina University (2023) confirmed a significant association between sitting duration, sitting posture, and student status with complaints of low back pain.

Medical students face particular risks due to the nature of their academic activities, which involve prolonged sitting during lectures, practicals, skills labs, and independent study. Symanzik et al. (2022) reported that 77.8% of students experienced back pain during the COVID-19 pandemic, with 79.1% experiencing neck pain, primarily due to distance learning that increased sitting time. Liu et al. (2025) showed that students had moderate knowledge but inappropriate practices related to spinal health. This condition is exacerbated by poor ergonomic posture and lack of physical activity, which results in increased compression of the intervertebral discs, particularly in the lumbar vertebrae.

Although various interventions have been developed to address low back pain, a strong evidence base for specific stretching programs in the student population remains limited. George et al. (2021) in clinical guidelines stated that physiotherapists can use exercise interventions, including specific trunk muscle activation, for patients with acute low back pain. Research by Chen et al. (2014) showed that 81% of participants in a stretching exercise program reported moderate to high levels of low back pain relief. However, research specifically examining the effect of stretching on low back pain in medical students, particularly in Indonesia, is still very limited.

Purpose, Urgency, and Novelty of the Research

Therefore, this study aims to identify the effect of stretching on low back pain intensity before and after intervention in students of the Faculty of Medicine, Prima Indonesia University in 2022, with the specific objective of measuring pain intensity before and after stretching and evaluating the effectiveness of the stretching intervention. The urgency of this study is supported by the findings of Haddadj et al. (2025) who showed that walking more than 100 minutes per day can reduce the risk of chronic low back pain by up to 23%, indicating the importance of physical activity in prevention. The novelty of this study lies in its focus on the Indonesian medical student population and the use of a structured stretching program that can be applied as a practical prevention strategy. The results of this study are expected to contribute to the development of low back pain prevention strategies among students, especially medical students, to improve their quality of life and academic productivity.

METHOD

Types and Methods of Research

This research is a quantitative study with a quasi-experimental design using a one-group pretest-posttest design. According to Sugiyono (2023), quantitative research methods can be defined as research methods based on the philosophy of positivism, used to study specific populations or samples, data collection using research instruments, and quantitative data analysis with the aim of testing predetermined hypotheses. The quasi-experimental design was chosen due to the impossibility of fully randomizing research subjects in a medical education setting. As explained by Creswell &

Creswell (2022), a quasi-experimental design is a research design that aims to evaluate the effects of an intervention using criteria other than randomization in assigning subjects to groups. The one-group pretest-posttest design is an experimental design in one group without a control group that takes measurements before and after treatment to determine the effect of the treatment. This method has the advantage of simplicity in comparing values before and after treatment, in accordance with the characteristics of the stretching intervention given to medical school students.

Population and Sample

The population in this study was 199 students of the Faculty of Medicine, Prima Indonesia University, class of 2022. According to Sudaryono (2021), a population is a generalized area consisting of objects or subjects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn. The sample determination used a random sampling method with the Slovin formula to determine the minimum sample size required. Emzir (2022) explains that the random sampling technique provides an equal opportunity for each member of the population to be selected as a research sample. The Slovin formula used is $n = N/(1+N(e)^2)$, where n is the number of samples, N is the population size, and e is the percentage error in sampling with a value of e = 0.1 (10%). Based on these calculations, from a population of 199 people, a research sample of 67 people was obtained. Inclusion criteria included active students of the Faculty of Medicine, Prima Indonesia University 2022 who experienced lower back pain and were willing to participate in the study, while exclusion criteria included students who did not complete the questionnaire completely, did not experience lower back pain, were undergoing medication or therapy, and were unable to stretch due to certain conditions.

Data Analysis Instruments and Techniques

The research instrument used was a structured questionnaire adapted from previous validated research. The intensity of low back pain was measured using the Numeric Rating Scale (NRS) with a range of 0-10, where 0 indicates no pain, 1-3 indicates mild pain, 4-6 indicates moderate pain, and 7-10 indicates severe pain. According to Creswell & Creswell (2022), the use of valid and reliable instruments is key to obtaining accurate data in quantitative research. Data analysis techniques used descriptive and inferential statistical approaches with the help of IBM SPSS software version 29. Univariate analysis was performed to analyze data from one variable independently using a frequency table with the formula P = f / n x 100, where P is the percentage of respondents' answers, f is the frequency, and n is the total number of respondents' answers. Bivariate analysis used the Wilcoxon test for non-normally distributed data or the paired t-test for normally distributed data, with the interpretation that if the p-value <0.05, there is a significant relationship between stretching and the intensity of low back pain. Sudaryono (2021) emphasized that selecting the appropriate statistical test must take into account the characteristics of the data and the assumptions underlying each test.

Research Procedures

The research procedure was carried out systematically through structured stages. Emzir (2022) explained that clear and systematic research procedures are a prerequisite for obtaining valid and reliable research results. The study began with a pretest in the form of a questionnaire to assess the participants' initial condition and measure the intensity of low back pain before the intervention. Next, participants were given treatment in the form of stretching exercises provided by the researcher according to a standardized stretching procedure. The stretching intervention was carried out following a protocol that included various stretching movements for the lower back muscles, with a predetermined duration and frequency. After stretching, participants were given a posttest in the form of a questionnaire to determine the intensity and changes that occurred after the treatment. According to Sugiyono (2023), the pretest-posttest procedure allows researchers to analyze changes that occur in the dependent variable before and after treatment. The data obtained were then analyzed to evaluate the effectiveness of stretching in reducing the intensity of low back pain in students of the Faculty of Medicine, Prima Indonesia University in 2022. All research procedures were carried out with due regard to research ethics and approval from the relevant ethics committee.

RESULTS AND DISCUSSION

Normality Test

Table 1. Test Results

Lower Back Pain Intensity	Sig.	Information
At the moment	<.001	Not normally distributed
After Stretching	<.001	Not normally distributed

Based on the normality test results table above, it is known that the significance value (Sig.) for the current NPB data and the NPB after stretching are both less than 0.05, namely <0.001. This indicates that both data groups are not normally distributed. Because the data is not normally distributed (Sig. <0.05), further hypothesis testing should use a non-parametric test, namely the Wilcoxon Signed Rank Test.

Homogeneity Test

Table 2. Test Results

sig.	Information
<.001	Not Homogeneous

Based on the results displayed in the table, it is known that the significance value for the homogeneity test is <0.001. This significance value is smaller than the significance level of 0.05 (Sig. <0.05), which means that the data does not meet the homogeneity assumption or has different variances between groups. Thus, it can be concluded that the data is not homogeneous, so in further hypothesis testing, it is better to use a non-parametric test, namely the Wilcoxon Signed Rank Test.

Bivariate Analysis

Table 3. Test of Differences in Lower Back Pain Intensity Before and After Stretching

	Mean	Elementary School	Asymp. Sig.
Current NPB Intensity	3.37	1,765	<0.001
NPB Intensity After Stretching	1.12	1.108	

Based on the results of the Wilcoxon test, a significance value (Asymp. Sig.) of <0.001 was obtained. This value is smaller than 0.05, which means there is a significant difference between the intensity of Low Back Pain (LBP) before and after stretching. The average LBP intensity before stretching was 3.37 with a standard deviation of 1.765, while after stretching, the average decreased to 1.12 with a standard deviation of 1.108. Thus, it can be concluded that there is a significant decrease in the intensity of low back pain after being given treatment in the form of stretching.

Discussion

The results of this study comprehensively demonstrate that stretching exercises significantly reduced the intensity of low back pain in students at the Faculty of Medicine, Prima Indonesia University, in 2022. Before the intervention, the majority of respondents experienced mild pain (59.7%), followed by moderate pain (35.8%), and severe pain (4.5%). After stretching, the proportion of respondents experiencing mild pain increased to 68.7%, while those in the normal category increased to 29.9%, and only 1.5% still experienced moderate pain. No respondents experienced severe pain after the intervention. These findings are consistent with previous research that suggests stretching exercises can improve muscle elasticity and reduce musculoskeletal pain complaints.

Statistical analysis using the Wilcoxon Signed Rank Test showed a significance value (Asymp. Sig.) of <0.001, indicating a significant difference between the intensity of lower back pain before and after stretching. The average pain intensity before stretching was 3.37 with a standard deviation of 1.765, while after stretching it decreased to 1.12 with a standard deviation of 1.108. This decrease demonstrates the effectiveness of stretching interventions in reducing the severity of lower back pain statistically and clinically. These results are in line with studies confirming that regular stretching can increase blood flow to the back muscles and reduce pressure on the surrounding lumbar tissue.

The factors exacerbating low back pain in respondents were predominantly prolonged sitting (52.2%) and incorrect sitting posture (23.9%). This supports the literature stating that non-ergonomic posture and lack of physical activity are the main risk factors for low back pain in students. The majority of respondents (91%) had also practiced stretching before, but not in a structured and routine manner. This study emphasizes the importance of a standardized stretching program as a simple and effective intervention to reduce low back pain complaints in the medical student population.

From a methodological perspective, the use of the Numeric Rating Scale (NRS) as a pain intensity measurement instrument proved practical and valid for assessing changes before and after the intervention. Univariate and bivariate analyses conducted using IBM SPSS version 29 software provided a clear picture of data distribution and intervention effectiveness. Normality and homogeneity tests indicated that the data were neither normally distributed nor homogeneous, thus selecting the non-parametric Wilcoxon test appropriately in line with modern quantitative research recommendations.

Systematically, the results of this study strengthen the evidence that stretching exercises can be used as a strategy to prevent and manage low back pain in students, especially those who frequently engage in activities involving prolonged sitting. This study also provides a novel contribution by focusing on the Indonesian medical student population, a population that has not previously been extensively studied. Therefore, these findings are expected to serve as a basis for developing preventive health programs in higher education settings and encourage students to engage in more regular stretching as part of a healthy lifestyle.

CONCLUSION

This study demonstrates that structured and regular stretching exercises effectively reduce the intensity of low back pain in students at the Faculty of Medicine, Prima Indonesia University in 2022. Statistical analysis showed a significant decrease in average pain intensity from 3.37 to 1.12 after the stretching intervention, with the majority of respondents moving from mild and moderate pain to normal. These findings strengthen the evidence that stretching can

increase muscle elasticity, improve blood circulation, and reduce pressure on lumbar tissues, making it a viable strategy for preventing and managing low back pain in a student population that frequently engages in prolonged sitting. This study also emphasizes the importance of educating and implementing standardized stretching programs in higher education settings to improve students' quality of life and academic productivity.

However, this study has several limitations, including the one-group pretest-posttest design without a control group, which limits the generalizability of the results. Furthermore, the subjective nature of pain intensity measurement using only one instrument was not strictly controlled. Furthermore, external factors such as off-campus physical activity and respondents' lifestyle habits were not strictly controlled. For future research, it is recommended to use an experimental design with a control group, expand the population and study location, and integrate more objective and multidimensional measurement instruments. The practical implications of this study include the need to integrate stretching exercises into campus health curricula and promote an active lifestyle as a preventative measure against low back pain among university students.

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