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EFFECTIVENESS OF ERGONOMIC EXERCISES ON SLEEP QUALITY IN TAILORS

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ABSTRAK

Penelitian ini bertujuan untuk menilai efektivitas intervensi latihan ergonomis dalam mengurangi nyeri muskuloskeletal dan meningkatkan kualitas tidur pada penjahit yang sering terpapar postur non-ergonomis. Nyeri muskuloskeletal, yang sering diperburuk oleh posisi statis atau repetitif yang berkepanjangan, berdampak signifikan pada kesejahteraan fisik dan kualitas tidur, yang pada akhirnya menurunkan produktivitas dan kualitas hidup. Penelitian ini menggunakan desain pre-test dan post-test, dengan Nordic Body Map untuk menilai tingkat nyeri dan Pittsburgh Sleep Quality Index (PSQI) untuk mengevaluasi kualitas tidur responden sebelum dan setelah intervensi. Uji t berpasangan menunjukkan penurunan signifikan pada nyeri muskuloskeletal, dengan selisih rata-rata sebesar 24,744 antara skor pre-test dan post-test pada Nordic Body Map, serta peningkatan kualitas tidur yang ditunjukkan oleh penurunan skor PSQI. Temuan ini menunjukkan bahwa latihan ergonomis yang terarah, termasuk koreksi postur dan teknik relaksasi otot, dapat secara efektif mengurangi ketidaknyamanan fisik dan meningkatkan kualitas tidur pada penjahit. Peningkatan ini mungkin disebabkan oleh berkurangnya ketegangan otot dan perbaikan sirkulasi darah yang dihasilkan dari aktivitas fisik rutin dan penyesuaian postur. Implikasi dari penelitian ini menekankan pentingnya mengintegrasikan program latihan ergonomis dalam kebijakan kesehatan di tempat kerja untuk mendukung kesejahteraan karyawan. Penelitian lebih lanjut sebaiknya mengeksplorasi efek jangka panjang dari intervensi tersebut di berbagai sektor pekerjaan untuk memastikan generalisasi dan menilai manfaat kesehatan tambahan.

Kata Kunci: Latihan Ergonomis, Nyeri Muskuloskeletal, Kualitas Tidur.

ABSTRACT

This study aimed to assess the effectiveness of ergonomic exercise interventions in reducing musculoskeletal pain and improving sleep quality among tailors who are frequently exposed to non-ergonomic postures. Musculoskeletal pain, often exacerbated by prolonged static or repetitive positions, significantly impacts both physical well-being and sleep quality, leading to decreased productivity and quality of life. The study involved a pre-test and post-test design, using the Nordic Body Map to assess pain levels and the Pittsburgh Sleep Quality Index (PSQI) to evaluate sleep quality among respondents before and after the intervention. A paired samples t-test revealed a significant reduction in musculoskeletal pain, with a mean difference of 24.744 between pre- and post-test Nordic Body Map scores, and a notable improvement in sleep quality indicated by reduced PSQI scores. The findings suggest that targeted ergonomic exercises, including posture correction and muscle relaxation techniques, can effectively alleviate physical discomfort and enhance sleep quality in tailors. This improvement may be attributed to decreased muscle tension and improved blood circulation resulting from regular physical activity and posture adjustment. The study's implications emphasize the value of integrating ergonomic exercise programs in workplace health policies to support employee well-being. Future research should investigate the long-term effects of such interventions across different job sectors to confirm generalizability and assess additional health benefits.

Keywords: *Ergonomic Exercise, Musculoskeletal Pain, Sleep Quality.*

INTRODUCTION

Optimal sleep quality is a vital aspect of maintaining both physical and mental health. Quality sleep not only facilitates physical recovery but also positively impacts cognitive functions, mood, and daily productivity (Fleisch et al., 2021) However, sleep disturbances are increasingly common among individuals engaged in jobs requiring prolonged sitting, such as tailoring. Tailors often spend hours in static sitting positions, which negatively impacts musculoskeletal health and ultimately disrupts sleep quality (Baker et al., 2018) Research by (Dzakpasu et al., 2021) found that sedentary workers, including tailors, are more prone to musculoskeletal issues, such as back pain, neck tension, and joint pain. Poor posture during work leads to accumulated muscle tension, which can impact comfort during sleep. As a result, many tailors experience significant sleep difficulties that interfere with overall sleep quality (Sortino et al., 2024) Further, (Demissie et al., 2024) found that prolonged sitting habits can reduce the range of motion, especially in hip flexibility, which contributes to discomfort during sleep. These findings indicate that musculoskeletal issues negatively impact both physical comfort and a healthy sleep cycle. With the increasing number of tailors experiencing sleep quality issues, it is crucial to find effective solutions to address this problem.

Extended sitting has significant long-term effects on musculoskeletal health, especially for sedentary workers such as tailors. One common complaint is lower back pain, where tension in the back muscles and instability in the spinal structure due to non-ergonomic sitting positions lead to prolonged pain (Djawa et al., 2023)Workers who spend hours sitting are more likely to report increased back pain compared to those who are physically active (Kett et al., 2021; Lurati, 2018) Additionally, static sitting positions impact neck and shoulder muscles, causing tension that often leads to neck and shoulder pain syndrome, which can hinder daily activities (Mirmohammadali et al., 2012) Prolonged sitting also limits joint mobility in the hips and knees, causing discomfort and pain, especially when performing physical activities after extended sitting (Okezue et al., 2020) Pain in the thighs and legs also frequently occurs due to excessive pressure on muscles and soft tissues caused by prolonged sitting. This discomfort can worsen if stretching or posture changes are not performed during sitting (Jung et al., 2021) Overall, the long-term impact of extended sitting on musculoskeletal health includes various types of pain and discomfort that can disrupt individual quality of life and productivity. (Dang et al., 2024)

Ergonomic exercises have emerged as a solution for improving health and well-being among sedentary workers. These exercises are designed to correct posture and strengthen muscles that are often underused due to prolonged sitting (Jabeen et al., 2023) Research has shown that ergonomic exercise programs can reduce muscle tension, improve flexibility, and, importantly, contribute to enhanced sleep quality (Suryati & Nggarang, 2020) Although many studies document the relationship between physical activity and sleep quality, few specifically explore the impact of ergonomic exercise on tailors. This research aims to fill that gap by evaluating the effectiveness of ergonomic exercise interventions on the sleep quality of tailors. The findings are expected to provide new insights into the relationship between physical activity and sleep quality, along with practical recommendations for tailors to improve their health and overall well-being.

METHODS

The study was conducted in Bandung over two weeks in October 2024, following approval from the Research Ethics Committee of the Faculty of Health Science and

Technology, Universitas Jenderal Achmad Yani, with Ethics Approval Number: 011/KEPK/FITKes-Unjani/X/2024.

This study employs a quasi-experimental design with a pre-test and post-test approach to evaluate the effectiveness of ergonomic exercise interventions on the sleep quality of tailors. According to (Hardani et al., 2020) a quasi-experiment is an experimental design conducted without randomization but involves assigning participants to groups. The quasi-experimental approach used here is the one-group pretest–posttest design. According to the one-group pretest–posttest design is also known as the before-after design.

The study subjects consist of 44 garment tailors registered at a tailoring business in Bandung. Inclusion criteria include individuals aged 20 to 50 years, with at least two years of work experience, and who spend more than 6–8 hours daily in a seated position at work. Conversely, exclusion criteria include individuals with a history of severe musculoskeletal disorders or previously diagnosed sleep disorders.

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Assessments are conducted using the Nordic Body Map to identify and evaluate areas of the body experiencing pain or discomfort before and after the intervention. This tool allows participants to indicate the location of pain on a provided body map, offering a clear view of the prevalence and location of muscle pain. In addition, sleep quality is measured using the Pittsburgh Sleep Quality Index (PSQI) before and after the intervention. This instrument consists of 19 items that assess various aspects of sleep, including duration, quality, and disturbances. A PSQI score of ≤ 5 indicates good sleep quality, while a score >5 indicates sleep disturbances.

Data obtained will be analyzed using SPSS statistical software. Descriptive analysis will be used to describe the demographic characteristics of participants, and independent t-tests and paired t-tests will be conducted to compare differences in sleep quality and musculoskeletal pain before and after the intervention in both groups. Statistical significance is set at $p < 0.05$.

RESULT AND DISCUSSION

Based on the statistical results of respondent characteristics, the age data shows that the majority of respondents are in the age range of 30-39 years. This is reflected in the mean age value of 2.02, indicating that most respondents fall into the 30-39 age category, according to the age coding provided. The median value of 2.00 further supports this, as it shows that half of the respondents are between 30 and 39 years old. Meanwhile, the minimum value of 1 indicates respondents aged between 20-29 years, and the maximum value of 4 indicates respondents over 50 years old.

For the gender variable, the average (mean) respondent score is 1.27, indicating that the majority of respondents are male with a median value of 1.00 also suggesting that more than half of the respondents are male. The minimum value of 1 and maximum value of 2 reflect that respondents are composed of only two genders: male and female.

ccupation variable, the average (mean) is 1.00, indicating that almost all respondents work as tailors. The median value of 1.00 further confirms that the majority of respondents are tailors, with only a slight variation in the types of jobs recorded.

Table 1. Frequency of Respondent Characteristics by Age, Gender, and Employment Status

Categories (N=44)	Frequency	Percentage (%)
Age		
20-29	10	22.7
30-39	25	56.8
40-49	7	15.9
50+	2	4.5
Gender		
Male	35	79.5
Female	9	20.5
Occupation		
Tailor	44	100
Total	44	100

Based on the statistical results for respondent characteristics, there were 44 respondents with valid data for the variables of age, gender, and occupation. For the age variable, the mean value of 2.02 indicates that the majority of respondents are in the age range of 30-39 years. The median value of 2.00 further confirms that most respondents fall within this age group. The age range of respondents varies from 20-29 years to over 50 years.

For the gender variable, a mean of 1.27 shows that most respondents are male, with a median of 1.00 supporting the predominance of male respondents. As for the occupation variable, all respondents have an occupation code of 1, indicating that all respondents work as tailors.

Table 2. Pre-test Pain Scale and Sleep Quality Before Ergonomic Exercise Intervention

Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
PRETEST NORDIC PRETEST PSQI	24.744	6.922	1.056	22.614 - 26.874	23.442	42	0.000

Before the intervention, there was a significant difference between the pain and sleep quality conditions of the respondents, based on the Paired Samples Test results between the Pre-Test Nordic Body Maps and Pittsburgh Sleep Quality Index. The average score for pain (Pre-Test Nordic Body Maps) was higher than the sleep quality score (Pittsburgh Sleep Quality Index), with a mean difference of 24.744. This indicates that the respondents tended to experience a high level of pain and relatively lower sleep quality before the intervention. The 95% confidence interval for the score difference, ranging from 22.614 to 26.874, along with a t-value of 23.442 and a significance of 0.000, shows that this difference is highly statistically significant. These data suggest that there were serious pain issues and suboptimal sleep quality among the respondents prior to the intervention, which served as the basis for implementing further interventions to improve these conditions.

Table 3. Post-test Pain Scale and Sleep Quality After Ergonomic Exercise Intervention

Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
POSTESTNORDIC POSTEST PSQI	34.953	7.435	1.134	32.665- 37.242	30.827	42	0.000

The results of the Paired Samples Test indicate a significant difference between the Post-Test Nordic Body Maps scores and the Pittsburgh Sleep Quality Index after the intervention. The mean difference between these two variables was 34.953, with a standard

deviation of 7.435 and a standard error mean of 1.134. The 95% confidence interval for this difference ranges from 32.665 to 37.242. The t-value of 30.827, with 42 degrees of freedom (df) and a significance level (Sig. 2-tailed) of 0.000, shows that this difference is statistically significant.

These results suggest that after the intervention, there was a significant change in the pain condition (Post-Test Nordic Body Maps) and sleep quality (Pittsburgh Sleep Quality Index) of the respondents, indicating that the intervention had a positive effect on both variables.

The analysis results show a significant reduction in musculoskeletal pain complaints following the intervention, with a substantial average difference between the Post-Test Nordic Body Maps and Pre-Test Nordic Body Maps. This decrease indicates that the applied program was effective in reducing pain complaints experienced by the respondents. These findings align with the research by (Lamprecht & Padayachy, 2019) which emphasized the importance of workplace exercise interventions to reduce musculoskeletal pain, especially for workers who are frequently exposed to non-ergonomic postures. In their study, regular physical activity was able to reduce muscle and joint tension, which are often the causes of pain complaints in the body. The significant pain reduction in this study suggests that interventions involving physical exercise and posture correction can be highly effective in alleviating musculoskeletal discomfort, frequently experienced by workers who remain in static or repetitive positions for extended periods.

Furthermore, this analysis also shows that respondents who participated in the intervention program experienced a significant change in their Nordic Body Maps scores, indicating a reduction in pain complaints in specific areas such as the back, neck, and shoulders after the program was implemented. This highlights the importance of a holistic approach to addressing musculoskeletal pain, which involves improving workplace posture and applying the correct ergonomic techniques. Implementing workplace exercise interventions, including stretching, muscle strengthening, and postural exercises, can reduce muscle fatigue and prevent injuries related to physical activities that are imbalanced or not ergonomic.

In addition to reducing pain, this intervention also contributed to an improvement in the respondents' sleep quality, as reflected in better Pittsburgh Sleep Quality Index (PSQI) scores post-test compared to pre-test. This suggests that improvements in physical condition, such as pain reduction, can positively impact sleep quality (Shariat et al., 2016) The pain reduction experienced by the respondents allowed them to sleep more soundly without the pain disturbances they typically face, particularly when lying down or resting. These findings are consistent with a study by (Huang et al., 2023) , which found that untreated musculoskeletal disorders can worsen sleep quality, particularly related to insomnia.(Heuel et al., 2024) They stated that constant pain, whether due to muscle tension or musculoskeletal injury, often disrupts an individual's ability to sleep soundly, ultimately affecting overall quality of life.

Based on the post-test analysis showing a significant improvement in PSQI scores, it can be concluded that the reduction in musculoskeletal pain through this intervention has a direct impact on sleep quality. Improving sleep quality is crucial because poor sleep can worsen an individual's physical and mental condition, while restful sleep can accelerate the body's recovery process after intense physical activity or work. In the context of this study, reducing musculoskeletal pain allows the body to relax more, reduces physical stress, and enhances the respondents' sleep quality.

In conclusion, the intervention program not only reduced musculoskeletal pain but also played a role in improving the respondents' sleep quality. The intervention, which involved physical exercises, posture correction, and relaxation techniques, has proven effective in addressing pain complaints that can disrupt sleep comfort. Additionally, these findings reinforce previous literature stating that untreated musculoskeletal disorders can cause sleep disturbances and a decline in overall quality of life (Wijayanti et al., 2019) Therefore, it is important to implement a comprehensive approach that focuses not only on pain management but also on factors affecting sleep quality, to achieve optimal physical and mental well-being for workers.

CONCLUSION

In conclusion, this study highlights the significant positive impact of ergonomic exercise interventions in reducing musculoskeletal pain and improving sleep quality among workers. The results demonstrate that the intervention, which focused on physical exercises, posture correction, and relaxation techniques, successfully alleviated pain, particularly in areas such as the back, neck, and shoulders, and led to better sleep quality. These findings underline the importance of addressing both pain management and sleep quality in workplace health programs. Future research should explore the long-term effects of such interventions and assess their applicability across various industries, contributing valuable insights to the field of occupational health and well-being.

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