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The Effect of *William Flexion Exercise* on Pain Levels in Batik Crafters with *Low Back Pain* in Laweyan

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ABSTRACT

Introduction: *Low Back Pain (LBP) is a localized pain in the specific area between the lower border of the ribs down to the sacrum. According to data from the World Health Organization (WHO), the global prevalence of this complaint reaches approximately 619 million individuals, equivalent to one in every 13 people worldwide. As a non-surgical intervention, the William Flexion Exercise is a physical training method specifically designed to alleviate complaints of Low Back Pain.*
Objectives: *This study aims to analyze the impact of implementing the William Flexion Exercise on the intensity level of Low Back Pain (LBP) experienced by batik craftsmen.*
Methods: *This research employed a Pre-Experimental methodology using a One-Group Pretest-Posttest design. Sample selection was conducted through a Non-Probability Sampling technique, specifically using a purposive sampling approach. A total of 15 batik craftsmen participated as the sample in this study. The William Flexion Exercise intervention was administered six times over a two-week period. The collected data were analyzed using the Wilcoxon Signed-Rank statistical test.*
Results: *In the pre-test phase (before treatment), the majority of respondents (73.3%) reported experiencing moderate pain. After the implementation of the intervention, there was a significant shift where the largest proportion of respondents (80%) experienced mild pain. The results of the Wilcoxon test showed a p-value of 0.002, which is less than the significance level of 0.05 ($p < 0.05$). This finding indicates that the William Flexion Exercise has a significant effect on the reduction of Low Back Pain.*
Conclusions: *It can be concluded that the implementation of the William Flexion Exercise is effective in reducing the intensity level of Low Back Pain suffered by batik craftsmen.*
Keyword: *Low Back Pain, Batik craftsmen, William Flexion Exercise.*

Pendahuluan: *Nyeri punggung bawah, atau yang secara medis dikenal sebagai Low Back Pain (LBP), merupakan rasa sakit yang terlokalisasi pada area spesifik di antara batas bawah tulang rusuk hingga ke bagian sakrum. Menurut data dari Organisasi Kesehatan Dunia (WHO), prevalensi keluhan ini secara global menjangkau kurang lebih 619 juta individu, atau setara dengan satu dari setiap 13 orang di seluruh dunia. Sebagai salah satu intervensi non-bedah, William Flexion Exercise adalah sebuah metode latihan jasmani yang dirancang secara khusus untuk meredakan keluhan Low Back Pain.*
Tujuan: *Kajian studi ini mengandung tujuan untuk menganalisis dampak dari penerapan William Flexion Exercise pada level intensitas Low Back Pain (LBP) yang dialami oleh para pengrajin batik.*
Metode: *Riset ini menggunakan metodologi Pra-Eksperimental dengan mengaplikasikan desain One-Group Pretest-Posttest. Penentuan sampel dilaksanakan melalui teknik Non-Probability Sampling, secara spesifik menggunakan pendekatan purposive sampling. Sebanyak 15 orang pembatik berpartisipasi sebagai sampel dalam studi ini. Intervensi berupa William Flexion Exercise diberikan sebanyak enam kali dalam periode dua minggu. Data yang terkumpul dianalisis menggunakan uji statistik Wilcoxon Signed-Rank Test.*
Hasil: *Pada tahap pre-test (sebelum perlakuan), mayoritas responden (73,3%) melaporkan mengalami nyeri dengan kategori sedang. Setelah implementasi intervensi, terjadi pergeseran signifikan di mana proporsi terbesar responden (80%) mengalami nyeri dalam kategori ringan. Hasil dari uji Wilcoxon menunjukkan nilai p-value sebesar 0,002, yang lebih kecil dari tingkat signifikansi 0,05 ($p < 0,05$), temuan ini mengindikasikan adanya pengaruh yang signifikan dari William Flexion Exercise terhadap reduksi Low Back Pain.*
Kesimpulan: *Dapat disimpulkan bahwa penerapan William Flexion Exercise secara efektif mampu mengurangi level intensitas Low Back Pain yang diderita oleh para pengrajin batik.*
Kata Kunci : *Low Back Pain, Pengajin Batik, William Flexion Exercise*

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Introduction

Low Back Pain (LBP), often referred to as low back pain, is a discomfort specifically located in the area between the lower ribs and the sacrum (Firnadi et al. 2022) . Today, this complaint has become a common health condition found in the majority of the population throughout their lives. Approximately one in every 13 individuals globally suffers from lower back pain, equivalent to around 619 million people. This represents a 60% increase in cases of *Low Back Pain* (LBP) (Putri et al. 2021). According to data released by the Directorate General of Health Services of the Indonesian Ministry of Health, the prevalence rate for LBP, also known as *Low Back Pain,* in Indonesia is recorded at 18%.

Lower back pain can arise from various triggers, such as lifting heavy loads, excessive stretching of the lower back muscles, a history of trauma or injury, and non-ergonomic body posture—for example, bending over, leaning to one side, and reaching or kneeling positions that can cause various effects *of Low Back Pai.* (Putri et al. 2021). Low back pain is a musculoskeletal disorder characterized by pain or discomfort in the lumbar region that can be accompanied by muscle tension, strain, or pain spreading to surrounding areas depending on the structures involved (Saraha et al. 2021).

The clinical manifestations of LBP include pain and muscle stiffness, which lead to limited movement, thereby hindering functional activities and reducing work productivity. (Hasmar & Junaidi 2022). Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (Suwondo et al. 2017). Upon reaching the age of 30, the degenerative process of bones begins to occur in line with aging; this condition is characterized by tissue damage, substitution of healthy tissue with scar tissue, and dehydration, all of which contribute to the weakening of bone and muscle stability (Rahmawati 2021). As age increases, the volume of synovial fluid in the body decreases, causing stiffness and limited movement in the joints. This can increase the risk of *Low Back Pain*, as the joints experience a decrease in elasticity and become more prone to injury. Therefore, maintaining joint health is crucial, and engaging in age-appropriate physical activities is essential(Faridah and Hadi 2024)(Faridah and Hadi 2024) (Faridah and Hadi 2024).

One of the triggering factors for LBP is prolonged sitting. Sitting for long periods can cause excessive strain and damage to the lumbar vertebrae, reducing joint lubrication and causing stiffness (Dinata 2021). One type of job that involves prolonged sitting is batik crafting (Aenia et al. 2023). Batik artisans often experience musculoskeletal complaints including low back pain, neck pain, (Fachrul Jamal et al. 2024). discomfort in the upper and lower extremities, and knee joint pain arising from batik-making activities that require repetitive movements over long periods. These factors can cause muscle fatigue and injuries to the musculoskeletal system, making it important to perform stretching exercises and implement good ergonomic work arrangements to reduce the risk of injury (Faridah & Hadi 2024).

Many batik workers are female. Gender is also one of the elements contributing to *low back pain*. *Hormonal fluctuations* in women starting from the premenopausal period can lead to an increase in body mass, which, when combined with non-ergonomic work postures, has the potential to increase the intensity *of low back pain* (Arti & Widanti 2024). At this stage, menopause can lead to reduced bone density due to estrogen deficiency, which increases the risk of osteoporosis and *Low Back Pain* (LBP). Therefore, it is important for menopausal women to maintain bone health through a balanced diet, calcium and vitamin D supplementation, and regular physical activity to reduce the risk of osteoporosis and LBP (Faridah and Hadi 2024).

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In essence, the load on the spinal discs (intervertebral discs) doubles when sitting compared to standing (Andriani et al. 2023). If this condition is ignored, it can lead to a decline in an individual's quality of life due to the onset of pain. Due to neuromuscular adaptation in the soft tissues of the spine, each person's perception of pain is different. This ranges from mild pain to pain requiring specific treatment (Hutasuhut, et al. 2021).

Effective Sitting for long periods of time, if you sit for seven to nine hours a day, can cause narrowing of the disc space and degenerative processes in the spine, which may trigger back pain, also known as Low Back Pain. Therefore, it is important to move and stretch regularly to reduce the risk of injury and maintain spinal health (Zuniwati 2021). Batik artisans work in a static position for approximately 8 hours/day from 7:00 a.m. to 3:00 p.m. A significant number of batik artisans experience reduced annual working hours due to musculoskeletal complaints, such as pain in the back and neck, which affects productivity and requires significant medical costs if the pain is severe and impairs mobility . The following preliminary study data conducted by the researcher is presented in table form

Table 1: Names of batik workshops and the number of LBP cases in Laweyan

No	Name of Batik House Batik	Total Employees	Total LBP
1.	Batik Mahkota	10	10
2.	Sentono Batik	10	8
3.	Merak manis Batik	7	5
4.	Aryu Batik	9	8
5.	Estu Mulyo Batik	2	2
6.	Dono Hadi Batik	5	3
7.	Putra Laweyan Batik	6	4
8.	Toeli Batik	2	2
	Total	51	

Source: Primary data, 2025

There are several methods that can be used to relieve or reduce lower back pain, with several approaches available, including pharmacological and non-pharmacological treatments. Pharmacological treatment involves the use of medications such as NSAIDs for patients with acute or chronic lower back pain, along with analgesics, muscle relaxants, and oral corticosteroids. Meanwhile, for non-pharmacological management that can eliminate or reduce *Low Back Pain* (LBP), one method is exercise using the *William Flexion Exercise* method (Humairah et al. 2023).

William Flexion Exercise training is a physical stretching program designed to relieve lower back pain as a non-surgical alternative (Putri et al. 2023). Basically, William Flexion Exercise is a physical training program designed to increase muscle flexibility and strength, as well as maintain joint mobility. This exercise is often applied in the field of physical therapy with the aim of supporting the recovery process, optimizing an individual's physical condition, and preventing injuries and musculoskeletal disorders (mailani 2024). *The William Flexion Exercise* includes methods aimed at increasing strength in the abdominal and

gluteus maximus muscles, while stretching the extensor muscle groups along the back area (Setiawan & Widiyanto 2022). Several techniques in the William Flexion Exercise involve variations in stretching movements aimed at expanding joint range of motion (Ratmawati & Kusumawati 2020). In this case, batik artisans are experiencing *low back pain* on a mild to moderate scale, so the intervention provided consists of simple *exercises* that can reduce pain and can be performed independently at any location and at any time as a form of early prevention against the occurrence of more severe *low back pain* (Ningsih and Hakim 2022).

Low Back Pain

LBP is a condition caused by musculoskeletal and neuromuscular disorders triggered by various factors, such as prolonged poor posture during activities or work and repetitive movements. (Purwanto et al. 2024). Ergonomic position errors are a cause of musculoskeletal disorders that reduce work productivity, and this remains a global issue in many countries (Zuniwati 2021).

LBP is a condition characterized by tears or strains in muscles or ligaments, which can occur suddenly in the form of sprains and lower back tension, or develop gradually over time due to repetitive movements (Agustina & Khiong 2023). The causes are diverse, one of which is radiculopathy, which occurs in the nerve roots due to nerve damage or compression (Saputra 2020). Work with excessive working hours can also be a triggering factor or aggravating factor for *Low Back Pain* (Wulan et al. 2020).

William Flexion Exercise

This element is a physical training strategy designed as a series of movements to relieve pain, focusing on strengthening the abdominal and gluteus maximus muscles while also helping to stretch the extensor muscle group (Halimah et al. 2022). *The William flexion exercise* is a therapy that can help relax tense muscles. When these muscles are relaxed, they can move freely without triggering painful sensations that interfere with movement and reduce the risk of muscle spasms or cramps in the lower back muscles (Hasmar et al. 2023).

The *William flexion exercise* that will be implemented has the effect of inducing vasodilation (vasodilation), resulting in more optimal blood circulation and nutrient distribution throughout the body. It can also stimulate the secretion of endorphins into the bloodstream, which in turn reduces pain and is followed by a reduction in muscle spasms or cramps (Mogi et al. 2024) . *William Flexion Exercise*, which focuses on physical activity, particularly targeting the flexor muscles in the lumbosacral region, primarily the abdominalis and gluteus maximus muscles. This exercise can be performed three times a week for twenty minutes and can provide significant benefits for individuals suffering from Low Back Pain (Widajati 2023).

Method

This study employs a quantitative approach, involving statistical data processing to compare and identify differences between conditions at the pre-test stage and after the intervention (post-test) is applied. The research adopted by the author is *a pre-experiment*, and this research will apply a one-group pretest-posttest research design. The location of this study is in Laweyan Batik Village with a population of 51 batik craftsmen in Laweyan Batik Village and a simple research sample of 15 respondents. This research was conducted six times over two consecutive weeks, with three meetings each week. Data were collected using observation and interview methods. There were 15 respondents with mild to moderate pain who met the inclusion and exclusion criteria. The inclusion criteria established in this study were (1) batik artisans at the Mahkota Laweyan batik house and the Sentono batik house. (2) Willing to be a respondent. (3) Respondents who did not consume pain medication and were

not undergoing other therapies. (4) Batik artisans who suffered from lower back pain with a severity level ranging from mild to moderate. Furthermore, the exclusion criteria in this study are (1) batik artisans who suffer from vertebral fractures. (2) Respondents who are not present at the time of the study. (3) Female batik artisans who are pregnant.

In this study, the instrument used to measure pain levels was the Numeric Rating Scale (NRS), which inherently has adequate validity, reliability, responsiveness, and ease of interpretation to be used as a single item in practice and clinical trials (Wuni et al. 2021).

Results

The data collection process for this research was carried out during May 2025 with 15 batik artisans at Mahkota Batik House and Sentono Batik House who suffered from low back pain and met the acceptance and rejection criteria determined at the outset. Pain data was collected from pain intensity evaluation observation sheets using the Numeric Rating Scale (NRS) before the intervention (pre-test) and after the intervention (post-test) at the end of the meeting *(post-test*). The following is the frequency distribution data of participant demographics according to age and gender.

Table 2 Frequency Distribution of Respondents by Age

Age	Frequency	Percentage
20-30	5	33.3
31-40	2	13.3
41-50	2	13.3
51-60	5	33.3%
61-70	1	6.7
Total	15	100

The data in Table 1 indicates that the most dominant age group of respondents suffering from low back pain is 33.3%, consisting of two age groups, namely 20-30 years old with 5 respondents and 51-60 years old with 5 respondents. For the 13.3% percentage, there are also two age groups, namely the 31-40 age group and the 41-50 age group, with two participants each. Meanwhile, the lowest number was recorded in the 61- 70 age group, which consisted of only one participant (6.7%).

Table 2. Frequency Distribution of Participants by Gender.

Gender	Frequency	Percentage
Female	11	73.3
Men	4	26.7%
Total	15	100

Table 2 shows that the composition of participants consisted of 11 females (73.3%) and 4 males (26.7%).

Table 3. Level of Low Back Pain Before Implementation of the William Flexion Exercise

Pain Level	Frequency	Percentage
No pain	0	0.0
Mild pain	4	26.7
Moderate pain	11	73.3%
Total	15	100

Referring to Table 3, it can be identified that before the *William Flexion Exercise* was administered, the highest percentage was in the moderate pain scale (73.3%) with 11 respondents, while the mild pain scale had a percentage of 26.7% with 4 respondents.

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Table 4 Level of *Low Back Pain* After Performing *the William Flexion Exercise*

Pain Level	Frequency	Percentage
No pain	0	0.0
Mild pain	4	26.7
Moderate pain	11	73.3%
Total	15	100

Referring to the data in Table 4, it can be seen that after the William flexion exercise treatment, the number of respondents experiencing moderate pain decreased to 2 participants (13.3%) and those with mild pain increased to 12 respondents (80.0%). There was also 1 participant (6.7%) who did not feel any pain.

Table 5 *Shapiro-Wilk* Normality Test Output

Research Data	Statistics	P-Value
Pain Scale Pre-Test	0.561	0.000
Pain Scale Post-Test	0.631	0.000
Total	15	100

According to the normality test findings presented in Table 5, it was found that the pain level data before and after the application of the William Flexion Exercise therapy had a p-value < 0.05; therefore, the data distribution was declared abnormal.

Table 6 *Wilcoxon Sign Rank Test*

Research data	Z	*Asym.sig (2-tailed)*
Level of low back pain Pre-test-post-test	-3.162	0.002

Based on the results of the Wilcoxon test, the asymmetric significance level (2-tailed) (0.002) < 0.05 indicates a significant difference in the level of low back pain before and after the William flexion exercise intervention.

Based on the results of the analysis, it can be concluded that William Flexion Exercise has an effect on the level of low back pain (LBP). Where the percentage of mild pain before William Flexion Exercise therapy was 26.7%, and after *William Flexion Exercise* therapy, the percentage of mild pain increased to 80%. The significant decrease can be proven by looking at the P-value of 0.001. Thus, it can be concluded that there is a significant impact of the William Flexion Exercise on low back pain experienced by batik craftsmen in Kampung Batik Laweyan. *The William Flexion Exercise* can be applied to various age groups, including adolescents, adults, and the elderly.

Discussion

The findings of this study demonstrate that William Flexion Exercise has a significant effect in reducing low back pain intensity among batik artisans in Laweyan. Before the intervention, most respondents experienced moderate pain. This condition is closely related to the nature of batik work, which involves prolonged static sitting, repetitive movements, and non-ergonomic postures. These factors increase mechanical stress on the lumbar spine, reduce joint lubrication, and lead to muscle fatigue and stiffness, ultimately contributing to low back pain.

After six sessions of William Flexion Exercise, the majority of respondents reported a reduction in pain intensity from moderate to mild, and one participant became pain-free. This

improvement can be explained physiologically. William Flexion Exercise focuses on strengthening the abdominal and gluteal muscles while stretching the lumbar extensor muscles. Strengthening these muscle groups improves spinal support and reduces excessive lumbar lordosis, thereby decreasing pressure on intervertebral discs and posterior spinal structures. In addition, stretching movements help reduce muscle tension and spasms, improve blood circulation, and enhance oxygen and nutrient delivery to tissues. Exercise also stimulates endorphin release, which acts as a natural analgesic, contributing to pain reduction. The statistically significant Wilcoxon test result ($p = 0.002$) confirms that the decrease in pain intensity was not due to chance. These results are consistent with previous studies showing that William Flexion Exercise is effective as a non-pharmacological management strategy for myogenic low back pain. This study also highlights that the exercise is practical, low-cost, and can be performed independently, making it highly suitable for workers such as batik artisans who are at risk of musculoskeletal disorders due to prolonged sitting and repetitive tasks. However, this study used a pre-experimental design without a control group and involved a small sample size. Therefore, while the results are promising, future research with randomized controlled designs and larger samples is recommended to strengthen the evidence

Conclusion and Suggestion

Based on the research findings and analysis regarding the impact of *the William Flexion Exercise* on pain levels in batik artisans with *low back pain* in Kampung Batik Laweyan, several conclusions can be formulated as follows:

1. Before the implementation of the William Flexion Exercise intervention, the intensity of low back pain (LBP) reported by the majority of respondents was classified as moderate.
2. After the application of the William Flexion Exercise intervention, there was a decrease in the number of participants with moderate pain, accompanied by an increase in the number of participants in the mild pain category.
3. Post-study data analysis confirmed the significant effect of the William Flexion Exercise on the low back pain complaints experienced by batik artisans after the treatment was administered.
4. The William Flexion Exercise, which was conducted in 6 sessions over a period of 2 weeks with a duration of approximately 10 minutes per session, proved to be effective in reducing low back pain.

This study is expected to contribute as a reference for further research and also serve as a reflection for the community regarding simple non-pharmacological techniques that can be performed independently to reduce the severity of low back pain caused by non-ergonomic body positions while working.

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