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The Effect of William Flexion Exercise on Low Back Pain in Pottery Artisans

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Abstract

The activities performed by individuals continuously and the presence of heavy loads during physical activities can cause pain in the lower back. The occurrence of lower back pain can interfere with activities during daily work, the pain felt makes the sufferer uncomfortable in moving parts of the body, namely the back and waist areas. Researchers will answer the question, "How does William Flexion Exercise affect low back pain in pottery craftsmen?" with a focus on a group of pottery craftsmen. With the Pre Experiment: One Group Pretest and Posttest Design. This study aims to determine the effects of William Flexion Exercise on LBP in pottery craftsmen for 4 weeks, focusing on a group of workers who have never been studied. The population in this study were 43 people. Total sampling technique with a sample size of 43 respondents. The intervention was carried out for four weeks with a duration of 2 William Flexion exercises every week, the time needed for each meeting was 45 minutes, by choosing and agreeing on the implementation day together so that all respondents were present when the intervention was carried out. While the instruments used were the William Flexion Exercise SOP, William Flexion Exercise leaflet and NRS which were used to calculate the level of pain, pain measurements were carried out in the first and last weeks of the intervention by the researcher by asking the pain scale felt from 0-10, and respondents chose a number according to the level of pain felt before and after the intervention. The statistical test used was the Wilcoxon Sign Test. The statistical test used was the Wilcoxon Sign Test. According to the findings of this study, William excersise was shown to have an impact on low back pain (p value <0.05).

Keywords: William flexion exercise, low back pain

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INTRODUCTION

Work in the *modern* era is inseparable from productive human life. In fulfilling daily needs, high physical and mental activity is demanded. However, in many sectors, work activities are often performed in a static manner, such as sitting for long periods or performing excessive repetitive movements without pauses. This has been identified as one of the main factors causing musculoskeletal disorders, especially LBP, which has become a major health problem in many countries, including Indonesia (Sidarto et al., 2022). LBP is health problem whose symptoms are pain, either acute or chronic in the lower back. This pain can be local, radicular, and can also be a combination of the two in the lumbosacral area, which can be triggered by inflammation, degeneration, gynaecological disorders, trauma, and metabolic disorders. Work factors such as heavy loads, improper work postures and repetition of movements are also triggers for *Low Back Pain* (Guesteva et al., 2021).

The Global Burden of Disease Study (2019) ranked LBP as the leading cause of disability and physical impairment worldwide (Lataoso & Saptaputra, 2024). According to WHO data (2022), musculo skeletal disorders affect an estimated 1.71 billion people worldwide, with LBP being one of the top three health problems. In 2022, approximately 17.3 million people worldwide experienced LBP, representing a large scale increase over the previous year. In Indonesia, the problem of LBP is also a serious concern. In 2017 LBP ranked 8th as the highest cause of DALYs Loss (*Disability-Adjusted Life-Years*) in Indonesia with an 84.1% increase in cases (Aliffia & Widowati, 2022). According to the Indonesian Ministry of Health (2023), the prevalence of LBP in Indonesia reached 18%. Meanwhile, Riskesdas data (2021) shows that the number of LBP sufferers in Indonesia is 12,914 individuals or 3.71%. This condition places LBP as the second largest health problem in Indonesia after Influenza (Mastuti & Husain, 2023).

Occupational diseases are defined as diseases that are directly or indirectly caused by a person's job duties or exposure to hazardous materials in the workplace, in accordance with Presidential Regulation No. 7 Year 2019. Workers are entitled to safety at work in order to perform their duties well and be more productive (Gunn et al., 2022). This right is regulated in Law No. 1 Year 1970 on Occupational Safety. Workers whose jobs require them to stand for long periods or use their hands repetitively, such as batik makers and pottery workers, are more prone to experiencing lower back discomfort (Faridah & Hadi, 2024).

Research by Sarbiah et al. (2024) shows that workers with static postures and repetitive activities have a higher risk of developing LBP, and this condition can reduce work productivity by 50-80%. In addition, LBP that is not treated properly can affect the physical and mental well-being of workers, reduce their quality of life, and ultimately have a negative impact on the social and economic conditions of their families. The treatment of LBP can be pharmacological, such as with the use of anti-pain medications, but this approach is only temporary and does not address the root cause of LBP. Therefore, non-pharmacological therapies, particularly physiotherapy, are becoming the primary choice in the management of LBP. Patients experiencing low back pain can experience relief and increased mobility in their lumbar joints by utilising William's Flexion Exercises (Halimah et al., 2023). In order to restore muscle balance, William's Flexion Exercises stretch the contracted muscles by stimulating the Golgi tendons and muscle spindles, in turn relaxing and stretching the muscles (Hasmar & Faridah, 2023).

In pottery craftsmen, activities in lifting heavy loads and lowering heavy loads, sitting too long in one position that is not anatomical and ergonomic can have a negative impact on the body, namely it can cause narrowing of the nervous system and tension in the waist muscles, this can cause pain in the lower back. Stretching is very necessary before doing physical activities and body positions when doing activities that put a burden on the body. Therefore, researchers will conduct interventions in the form of William Flexion exercises before carrying out pottery making activities. This study is different from previous studies that focused on office workers, operating room nurses who stand for a long time and lift patients, while this study focuses on pottery craftsmen who live in rural areas far from urban areas and lack information related to William Flexion exercises, the frequency of this exercise is carried out for 4 weeks.

Based on preliminary studies on 6 October 2024 at the study site, namely in East Masbagik Village, Masbagik District, the number of sufferers feeling *Low Back Pain* was 43 people. Based on the findings of interviews conducted by researchers with 10 individuals feeling *Low Back Pain*, data obtained from 7 respondents with moderate pain levels on a pain scale of 5-6 which greatly interferes with daily activities, especially in work, while 3 respondents with mild pain levels with a pain scale of 3 said they could carry out activities as usual. In reality, pottery craftsmen in Masbagik Timur Village, Masbagik District do not know

the William *Flexion* exercise method in overcoming back pain and they overcome the problem by resting or leaving it alone.

METHOD

Study design and setting

We conducted a quantitative, pre-experimental one-group pretest–posttest study to evaluate the effect of Williams Flexion Exercises (WFE) on low back pain (LBP) among pottery artisans in Masbagik Timur Village, Masbagik District, East Lombok, Indonesia. The design was chosen to describe within-person change over a four-week intervention and to mirror how the program would be delivered in this community setting.

Participants and sampling

The study population consisted of all pottery artisans in the village (N=43). We used total sampling, enrolling all 43 eligible artisans to maximize coverage and to match how the intervention would be implemented locally. Descriptive characteristics (sex, age group, and education) were documented to contextualize outcomes and align with the summary table presented in the Results.

Eligibility criteria

Inclusion criteria were: (i) active pottery artisan residing in Masbagik Timur; (ii) self-reported LBP; (iii) ability to participate in scheduled sessions and complete outcome assessments. Exclusion criteria were set to minimize confounding by acute pathology or concurrent care: (i) red-flag symptoms requiring urgent medical evaluation; (ii) recent initiation (≤2 weeks) of new pharmacologic or physiotherapy treatment for LBP; (iii) prior spine surgery; and (iv) inability to follow exercise instructions. These criteria reflect the population described in the paper and the pragmatic nature of a one-group community intervention.

Intervention (Williams Flexion Exercises)

The intervention followed the Williams Flexion Exercise SOP and was supported by a participant leaflet to standardize delivery and reinforce home practice. Sessions were held twice weekly for 4 weeks (8 sessions total), 45 minutes per session, on days agreed upon with participants to maximize attendance and continuity. Group instruction emphasized correct technique, breathing, symptom-guided pacing, and safe range of motion. Coaching cues were taken directly from the SOP and leaflet, which structured the sessions and ensured consistency across weeks.

To promote fidelity, facilitators used the SOP as a checklist (set-up, demonstration, supervised practice, and cool-down). Adherence was operationalized as attendance at scheduled sessions (recorded per session). Any deviations (session rescheduling or missed components) were logged. The leaflet provided simple illustrations and step-by-step cues paralleling the supervised content to improve skill retention between sessions.

Outcome measures

The primary outcome was pain intensity on the Numeric Rating Scale (NRS; 0–10), assessed at baseline (week 1) and post-intervention (end of week 4). In addition to reporting the raw NRS, we summarized categories to match how results are presented in the manuscript: no pain (0), mild (1–3), moderate (4–6), and severe (7–10), enabling a direct comparison with pre/post category distributions in the Results tables. We pre-specified a minimal clinically important difference (MCID) as a ≥2-point reduction on the NRS to convey clinical relevance of change at the individual level. Instruments used were the WFE SOP, WFE leaflet, and the NRS scale.

Data collection procedures

Outcome assessment occurred at the first and last week of the intervention. At each time point, the researcher asked participants to rate their average low back pain over the preceding

few days on the 0–10 NRS. Ratings were recorded on paper forms with participant codes; forms also captured session attendance and any exercise-related symptoms. Scheduling of sessions was done collectively with participants to maximize participation and reduce missing data. The emphasis on a fixed pre/post schedule mirrors the within-participant comparison used in the Results section.

To support data quality, assessors used a brief script to standardize NRS instructions; forms were checked at the end of each session for completeness. If a participant missed a post-intervention assessment, a make-up assessment within 72 hours was attempted. No imputation was planned for missing NRS scores; analyses were conducted on complete pairs only.

Statistical analysis

Given the paired, ordinal nature of NRS data, the Wilcoxon signed-rank test was pre-specified to compare pre- and post-intervention pain. We planned to report medians (IQR) at each time point, the paired median change (IQR), and the effect size calculated as $r = Z/\sqrt{N}$, with qualitative interpretation. Exact p-values are presented with conventional formatting (e.g., $p<0.001$ rather than "0.000"). To align with the Results summary, we also tabulated category transitions (no/mild/moderate/severe pre → post) and the proportion achieving MCID (≥2-point NRS reduction). All tests were two-sided with $\alpha=0.05$.

Because the study used a single-group design, no formal between-group comparisons were conducted and no subgroup analyses were planned (sex distribution was uniform and the study was not powered for age/education strata). Analyses were performed on the analytic sample with paired pre/post NRS data. The choice of Wilcoxon is consistent with the inferential approach reported in the paper.

Bias mitigation, fidelity, and safety monitoring

We minimized performance bias by following a standardized SOP and using the leaflet to reinforce the same sequence and cues across sessions. Detection bias was limited by using a single, simple instrument (NRS) at fixed time points with a standardized script. No blinding was feasible in this community program; this is acknowledged and addressed in the Discussion as a design limitation. Adherence (attendance) was recorded each session; any adverse events or exercise-related symptom exacerbations were to be documented on session logs and reported to the supervising investigator and, if necessary, referred for clinical assessment.

Sample size rationale

This was a census of the accessible population (total sampling, N=43) rather than a hypothesis-driven power-based sample. The choice reflects the programmatic aim to deliver and evaluate the intervention for all artisans in this village during the study window. The trade-off (limited external validity and lack of control group) is acknowledged in the interpretation.

Ethical considerations

The study received approval from the STIKes Hamzar Ethics Committee (No. 076/UE/Lppm-STIKZAR/II/2025, February 18, 2025). All participants were briefed on study aims, procedures, potential benefits/risks, data handling, and the voluntary nature of participation. Written informed consent was obtained prior to enrollment.

RESULTS AND DISCUSSION

The following presents the results and discussion of research consisting of the characteristics of respondents, before and after being given *William flexion* exercises on the level of *low back pain*, as well as *the effect of William flexion* exercises on the level of *low* back pain.

Respondent Characteristics

Table 1 illustrates that all participants in this study were female (100%). Based on age, it shows that most participants are in the age range of 41-50 years, 24 respondents (55.8%) and

the age group of 30-40 years is the least number namely 4 respondents (9.3%) of the total respondents. Based on education, the majority of respondents had elementary education as many as 16 respondents (37.2%) and junior high school 14 respondents (32.6%), showing the dominance of basic education. Respondents with the least level of education were high school as many as 4 respondents (9.3%).

Table 1. Distribution of gender, age, and education among pottery artisans in Masbagik Timur Village.

Gender	f	%
Female	43	100
Total	43	100
Age		
30- 40 years	4	9.3
41-50 years old	24	55.8
51-60 years old	10	23.3
>60 years	5	11.6
Total	43	100
Education		
Not in School	6	14
SD	17	39.5
SMP	16	37.2
HIGH SCHOOL	4	9.3
Total	43	100

Level of *Low Back Pain* Before and After *William Flexion Exercise* in East Mabagik Village, Masbagik District

Table 2 shows that before being given *William flexion exercise* to the level of *low back* pain, 41 respondents (95.3%) experienced moderate pain and mild pain as many as 2 respondents (4.7%). After the intervention with *William Flexion Exercise* against *low back pain*, the results of observation of pain levels showed no pain as many as 2 respondents (4.7%), mild pain 38 respondents (88.4%) and moderate pain as many as 3 respondents (7.0%).

Table 2. Effect of *William Flexion* exercise on *Low Back Pain.*

Pain Level	**Percentage of *William Flexion Exercise***				***P-value***
	Pre-test	**%**	***Post-test***	**%**	
No pain	0	0	2	4.7	
Mild Pain	2	4.7	38	88.4	
Moderate Pain	41	95.3	3	7.0	
Severe Pain	0	0	0	0	***0.000***
Total	**43**	**100**	**43**	**100**	

Discussion

Level of Low Back Pain Before William Flexion Exercise

Utilising the NRS scale, evaluated the severity of low back pain prior to *William's Flexion*. 0% of participants reported no pain, 4.7% reported mild pain, and 95.3% reported moderate pain. After the *William's* Flexion was administered, the Wilcoxon test findings illustrated a range of back pain ranging from mild to moderate.

Over-utilisation or other forms of mechanical stimulation activate muscle receptors, resulting in *lower back pain*. Ischemia and inflammation arise, resulting in pain and worsening muscle spasm. Muscle spasm can cause pain by three different pathways. Firstly, activation of muscle spasm pain receptors occurs via mechanosensitive pathways. Secondly, the

compression of the muscle spasm blood vessels causes ischaemia and discomfort. Thirdly, the ischaemia situation becomes much more severe due to the increased metabolic rate of muscle tissue caused by muscle spasm (Sahara & Satria, 2020).

Researchers found low back pain reduces productivity given that it stops people in their daily activities, increases the likelihood of pain returning, and makes it difficult to avoid poor posture and other causes of the condition. One of the causes of low back pain is overexertion, which includes prolonged sitting, poor posture, and doing the same activity over and over again. According to the researcher's assumption, the mild pain scale felt by pottery craftsmen is due to never stretching before doing physical activity. If this is done continuously, the pain will get worse and interfere with activities and reduce productivity at work.

Level of Low Back Pain After William Flexion Exercise

After being given *William Flexion* exercise, the highest level of *low back pain* was mild pain as many as 38 respondents (88.4%) and the lowest level of pain was no pain as many as 2 respondents (4.7%). The difference in pain levels after giving William Flexion Exercise is due to differences in pain perception of each individual.

William's flexion exercises help keep the posterior flexor and extensor muscle groups of the back in a balanced position, in turn reducing pressure on the area (Juliastuti, 2022). Active abdominal muscle training as well as passive stretching of the gluteus maximus, hamstring, hip flexor and sacrospinal muscles are therapeutic benefits of William's flexion exercises that can relieve LBP and improve lower trunk stability (Afifa et al., 2023).

Maysaroh et al. (2021) found a significant decrease in pain scores before and after the intervention, along with a decrease of 4.5 points after 8 sessions of William Flexion Exercise, and a p score of 0.001 (p value <0.005), thus supporting the hypothesis, which is supported by the results of this study. Patients suffering from Myogenic LBP at RSU Mardi Waluyo Blitar City showed statistically significant improvements in their pain levels between the pre- and post-intervention tests, suggesting the eight sessions of *William Flexion* Exercise intervention was successful in reducing pain.

Based on the view that *William Flexion Exercise* has significant in reducing pain levels in individuals with LBP. It was proven by the majority of respondents experiencing a decrease in pain after the intervention, where 88.4% of respondents only felt mild pain and 4.7% did not even feel pain at all. Differences in pain levels after the intervention can be influenced by the perception of each individual. Although the intervention was given in the same duration, each individual's response to pain remains subjective. With a decrease from moderate pain to mild pain, the William Flexion Exercise intervention can be carried out continuously before carrying out pottery making activities so that the craftsman's physique is maintained and productive in producing pottery and is free from lower back pain and a hunched or non-anatomical body posture.

The Effect of William Flexion Exercise on Low Back Pain Levels

A Wilcoxon test p value of 0.000 (p value < 0.05) was found in the pre-test as well as post-test results, indicating *William's flexion* exercise relieved LBP (see Table 3). Pain levels ranged from mild to severe before these exercises were administered. The range of discomfort felt after performing *William's flexion* stretching exercises ranged from mild to none. Based on this study, all respondents were women, this happened because the culture of the local community, namely men or husbands of respondents worked as traders, and also workers in the market, as well as being Indonesian migrant employees, this made the pottery craftsmen more dominated by women, because they had to remain at home and while guarding children.

In this study, there was no placebo giving which aims to avoid normal in the results of the study, but the efforts of researchers were by selecting respondents who had pain scale with a medium category that did not require pharmacological treatment. Moderate pain can be

overcome with non-pharmacological techniques such as William's flexion exercise, while severe pain must get pharmacological treatment, it can be assumed that in this study William flexion exercises can reduce moderate pain into mild pain and even no pain.

Table 3. Effect of *William Flexion* exercise on *Low Back Pain.*

Assessment	Mean±SD	*Mean Rank*	*Z Score*	*p-value*
Pre-Test	2.95±0.123	20.00	-6.172	***0.000***
Post-Test	2.02±0.344			

The study found individuals suffering from LBP reported significantly less pain following William's flexion exercise. The fact that three individuals (7.0%) reported continued pain after the intervention shows that pain responses vary between individuals. People respond to pain differently. As pain is subjective, some individuals continue to experience pain despite physiological improvements in their muscles and spinal structures. Pain-related anxiety and other social and psychological variables can also influence how we perceive pain. Exercising with William Flexion has been shown to increase levels of β-endorphin, a specific endorphin hormone. β-endorphin is a neuropeptide produced by the body when calm or relaxed. In addition to stimulating endorphin production in the blood, the back movements in William Flexion exercise can dilate blood vessels, improve blood circulation and ensure adequate nutrient supply. After that, there is no more experiencing many painful muscle spasms. The stretching movements in this exercise, promoting muscle contraction, contribute to pain reduction. To generate energy during muscle contraction, the body breaks down ATP, calcium, and oxygen. This process improves blood circulation and the efficiency of the muscle transport system for substances such as lactic acid (Putri et al., 2023).

Eight sessions spread over four weeks formed the *William's Flexion* intervention protocol. This exercise was given twice a week for one month along with a duration of 45 minutes per session, in line with the Maysaroh et al. study (2021). STRADA Indonesia's KEI for Health Sciences granted approval for this study (No. 2599/KEPK/VIII/2021). A study in Pringanom Village, Sragen, found residents experienced a reduction in LBP after performing *William's Flexion* (Wulandari & Wulandari, 2024). The findings of this study aligned with the study of Sidarto et al. (2022), showing *William's Flexion* significantly reduced discomfort between pre-test and post-test. This suggests that people suffering from myogenic LBP may find relief along with *William Flexion* exercise. *William Flexion* exercise was shown to be effective when reducing the level of LBP among PKK members in Tejogan Village, based on the study of Setiawan and Widiyanto (2022). The reduction in LBP levels was due to the fact participants worked together to follow each exercise, stretching their muscles and contributing to an overall reduction in pain levels.

The researchers hypothesised that *William Flexion* Exercise relieves LBP by increasing endorphin levels and improving blood circulation, both of which are due to the physical conditions of the exercise. *william flexion exercise* performed for 1 month along with a dose of 2 times a week for 45 minutes has not been able to reduce the pain of LBP sufferers in all respondents at the level of no pain. Based on several journals, researchers assume William flexion is more effective when carried out for 1 month along with a dose of 3 times a week for 45 minutes.

To maintain the level of pottery compliance, the researcher also provides Leafleat William Flexion Exercise that can be read and follows every teachings that have been taught, and researchers provide education to Posyandu cadres about the importance of William Flexion Exercise using leafleat and training cadres doing William Flexion Flexion Exercise. Elderly Posyandu activities followed by adults and the elderly can be a good and sustainable momentum in the education of William Flexion Exercise intervention. The activity is to prevent

the recurrence and follow -up of intervention on an ongoing basis and is a mandatory activity in the elderly posyandu activities. This is the right step in increasing community understanding, especially those who have heavy activities.

CONCLUSION

In this study, all 43 participants were female, most of them were between 41-50 years old (24 out of 55.8%), and most of them had completed at least primary school (16 out of 37.2%) or junior high school (14 out of 32.6%), indicating that low education level was more common. Almost all participants (95.3%) who reported LBP before starting *William's flexion* exercise had moderate pain. After performing *William*'s *flexion* exercises for LBP sufferers, 38 patients (88.4% of the total) reported feeling only minimal discomfort. *William's flexion* exercises reduced pain levels in individuals with LBP, as shown by a p-value of 0.000 (p-value < 0.05).

RECOMMENDATION

For further researchers, they can collaborate with physiotherafi officers, elderly posyandu cadres, as well as puskesmas officers to provide assistance and training for pottery craftsmen. In the research process can be done simultaneously in one location to facilitate learning and evaluation of the interventions provided.

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