



The Effect of Back Exercise on the Prevention of Low Back Pain Among Office Employees of Red Justice Law Institute, Bogor Regency

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Abstract

Low back pain is a very typical issue that office workers face because they sit for long periods and often have bad posture. In order to avoid low back discomfort among office workers at the Red Justice Law Institute, Bogor Regency, this study intends to examine the impact of back exercises. One group completed a test both before and after the intervention as part of the pre-experimental methodology used in the study. The participants were 23 employees, chosen through total sampling. The Straight Leg Raise (SLR) test was used to assess LBP before and after intervention. To evaluate the data, the paired sample t-test was employed. Pretest and posttest scores differed significantly ($p < 0.05$), according to the results, suggesting that back exercise effectively prevents low back pain. In summary, back exercises are a non-pharmacological way for office workers to avoid and lessen lower back pain.

Keywords: *Back Exercise, Low Back Pain, Office Workers*

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INTRODUCTION

Low back pain (LBP) could be a worldwide wellbeing concern that enormously increments laborer inadequacy. Within workplace settings, repetitive tasks, sedentary behavior, and poor ergonomic postures increase the risk of LBP. WHO (2017) reported that 80% of the global population experiences LBP at least once in their lifetime. In Indonesia, LBP prevalence reaches 18% (RI Ministry of Health, 2018). Several studies (Susilawati dkk., 2019) confirm the effectiveness of back exercise in reducing musculoskeletal complaints. However, there is limited empirical research conducted among office workers in legal institutions. Therefore, this study

fills the gap by investigating the effect of back exercise on LBP prevention among employees at the Red Justice Law Institute.

Red Justice Legal Institute in Bogor Regency are at risk for *low back pain* (white-collar workers). *Low back pain* is caused by work postures, prolonged sitting, long working hours, and poor posture, which are frequently performed by workers with high frequency and intensity. Office workers generally use computers for long periods of time and with poor sitting posture. Long periods of sitting and bad posture raise the chance of developing low back pain (Yasar dkk., 2019).

Poor working posture causes increased compression on *the intervertebral discs* , which can damage the surrounding tissue. Furthermore, prolonged sitting can lead to lower back muscle fatigue, leading to *low back pain*. Another work-related (Pillai & Haral, 2018) risk factor for *low back pain* is physical activity. Low physical activity, or physical activity requiring *less* than 600 METs (*Metabolic Equivalent*) per week, is linked to an increased incidence of discomfort in the lower back. High levels of physical activity (more than 300 METs per week) are linked to better disability and a lower risk of low back pain. This is because physical activity increases muscle strength and flexibility, making it more resilient to mechanical stress (Gobbo & Bullo, 2019). Poor sitting posture, prolonged sitting, and lack of physical activity can contribute to low back pain.

The National Safety Council records the most common occupational disease is low back discomfort, accounting for 22% of the 1.7 million cases. Around 15% to 20% of people in a number of underdeveloped nations suffer from low back pain altogether, with most of it being acute or chronic. In 2018, educated by the Directorate Common of Wellbeing Administrations, Service of Wellbeing, Republic of Indonesia, *low back pain's* frequency in Indonesia was 18% of the total population of 285,721,236 .

Some ways to manage *low back pain* include engaging in activities appropriate to the patient's abilities, muscle-strengthening exercises, maintaining a healthy diet, and adequate rest. One treatment for *low back pain* is non-pharmacological therapy, namely *back exercises*, which can strengthen muscles, reduce pressure on the spine and joints, and strengthen muscles, all of which

can reduce pain.

Back exercises are a form of exercise introduced by Dr. Paul Williams. They strengthen the core muscles and back muscles, resulting in a more physiologically upright posture. Properly performed over a relatively long period of time, (Sari dkk., 2019) *back exercises actively increase muscle strength, thus leading to the development of active stabilization*. *Back exercises* are exercises that can reduce *low back pain* by combining flexion movements. These exercises are beneficial for increasing muscle strength and also have the effect of increasing endurance against static and dynamic changes in movement or loading (Prasetyo, 2018). Back exercises are exercises that can reduce low back pain and increase muscle strength.

In Harwanti's research captioned *The Impact of Stretching Exercises (back exercise) on Reducing Low Back Pain in Office Workers in Kauman Soka Village*. Amid the primary and moment weeks, the measures of complaints of moo back torment created a p esteem of $0.000 < 0.05$ (Harwanti dkk., 2018). Research conducted by Indri Susilawat on the effect of back muscle strengthening exercises (*Back exercise*) to prevent back pain (*Back pain*) in lecturers and employees of IKIP Mataram, the study's findings revealed that the typical after the strength of the back muscles was given muscle strengthening back exercise treatment experienced an increase from the average strength of the back muscles before receiving back muscle strengthening exercise treatment of 82.53 to 97.44. Thus, it can be said that back exercises have an impact on how often lecturers and staff members complain of back pain of IKIP Mataram (Susilawati dkk., 2019)

Based on research from Ni Luh Made Dwi on how back exercises affect *low back pain scale* in carving craftsmen, the comes about of the think about appeared a noteworthy distinction between the control group's and the back work out treatment group's moo back torment measures over the course of treatment, with a p value = 0.000. So therefore, it can be said that back exercises have an impact on *low back pain* complaints among carvers (Sari dkk., 2019). The findings of the study demonstrated that low back pain is impacted by back exercise, and that when back exercise is performed, low back pain decreases. The reason of this think about was to decide how back works out influenced the avoidance of moo back torment in workers of Ruddy Equity Lawful Institution, Bogor Rule.

Low Back Pain

Low back pain is torment felt within the lower back. It can be localized, radicular, or both. This ache is felt between the lower buttocks and the corners of the lower ribcage, in the lumbar or lumbosacral region, and is often accompanied by pain radiating to the legs and feet. *Low back pain* that endures more than six months is considered inveterate (Sadeli et al., 2001).

Low back pain is a prevalent musculoskeletal disorder that causes long-term morbidity and is the most common pathology experienced by the general population. Its subsequent impact is related to physical limitations and productivity. It is a multidimensional problem as a condition that is clinically described as muscle problems, With or without discomfort extending to the legs, the joints situated above the gluteal fold and below the thoracic 12 have reduced range of motion and pain (5–9). The tissues causing the problem include *ligaments, discs, nerve roots, muscles, fascia, dura, and zygapophyseal joints*. *Psychological, social, pathoanatomical, and neurophysiological* elements are other important factors (Wahyuddin, 2016) The indications of *Low back pain* incorporate torment within the range around the lower back and between the lower buttocks and the corners of the lower ribs.

There are two categories of risk factors for low back pain: first, individual factors consisting of age, Body Mass Index (BMI), gender, and length of service. Second, occupational factors consisting of workload, duration (duration of the task), work position, repetition, and physical environment factors (Lutam, 2005:51). These factors are classified as causes of low back pain.

Back Exercise

Back exercises were first introduced and used to restore strength, endurance, and flexibility of the back muscles by Dr. Paul Williams in 1937. They target the back's stabilizer muscles. *Back exercises* are a form of therapy that involves specific exercises or movements to help and support the strength of the spinal muscles. These exercises focus on contracting the core muscles, the lower back muscles, and the leg muscles. The stretching involved in *back exercises* can prevent tissue adhesions, maintain muscle elasticity and contractility, and prevent inflammation in the joints, thus improving and maintaining range of motion. *Back exercises* tend to focus on relaxing

the lower back, which may have analgesic properties. The spinal gate closes when proprioceptors, which are large-diameter efferent fibers, are stimulated by light, gradual motions (Harwanti dkk., 2018). Back exercises are exercises that support spinal muscle strength.

According to Suharjana in Sufreshtri and Puspitasari, there are several benefits of *back exercise* , namely: to reduce pain, to strengthen the abdominal muscles and around the back, to reduce mechanical stress *on* the spinal structure, to increase fitness, to prevent injury, to stabilize segments that experience slackness (*hypermobile*), and to improve posture (Septiani dkk., 2020). The various benefits of back exercise can reduce pain, strengthen abdominal muscles, and others.

Back exercise movements can be done as follows:

1. Shoulder Roll Rubber

Standing position, feet shoulder-width apart. Hands holding *the elastic* , *shoulders* rotate from front to back and back forward 180°. This movement trains the shoulder muscles, especially the *deltoids* , *anterior head* , and *middle head* . Do this movement 15 times x 3 sets.



Figure 1 Shoulder roll rubber
(personal source)

2. Back Rubber

Hold *the elastic* straight above your head. Pull *the elastic* wide and lower it parallel to your shoulders, forming a "W" shape, until you feel your shoulder blades slowly return to their starting position. This movement works the *back muscles* , especially the *teres minor* and *teres major* . Do this movement for 15 repetitions in 3 sets.

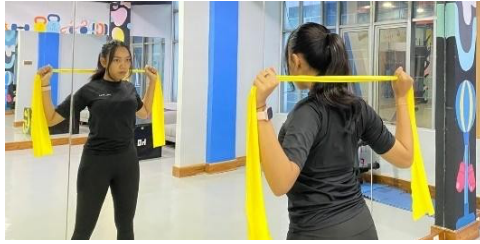


Figure 2 Back rubber
(personal source)

3. Knee up

Starting by standing upright with your feet shoulder-width apart, lift your knees parallel to your hips, starting with the right knee and then the left. This movement works the *rectus femoris muscle*. Count each knee as one when the right and left knees rise. Do 15 repetitions in 3 sets.



Figure 3 Knee up
(Personal source)

4. Bridge Pose

Lie on your back, bend your knees, adjust the distance between your heels and your buttocks and make sure the soles of your feet are on the floor. Place your hands beside your body and touch the mat. Slowly lift your hips and slowly lower your hips. Return to the mat. This movement trains the *gluteus muscles*, do 15 repetitions x 3 sets.



Figure 4 Bridge pose (personal source)

5. Airplane

Face the floor with your arms straight down. Slowly raise your right leg and left arm straight up until they are parallel with your back. Alternate between the left leg and right arm. This movement works the *thoracolumbar fascia and teres minor muscles*. Hold this position for 20 seconds, two sets.



Figure 5 Airplane (personal source)

6. Back up rubber

Lie face down, straighten your arms, and hold the elastic. Lift the elastic as high as possible, keeping your head still (only your arms should be raised). This movement works the *trapezius muscles*. Do this for 10 repetitions, 3 sets.



**Figure 6 Back up rubber
(personal source)**

Red Justice Legal Institution of Bogor Regency

Red Justice Legal Institute of Bogor Regency is an online legal services provider founded on December 9, 2021. The name " *RED Justicia* " comes from the abbreviation *RED* , which stands for *Recht Education for Democracy* , meaning legal education for democracy, while the word *Justicia* means justice. Thus, *Red Justicia* carries the mission of being a legal education platform that supports democracy and social justice. *Red Justicia* not only provides a digital platform to facilitate access to legal services but also actively provides legal education to the public both online and offline. With an inclusive and adaptive approach to technological developments, *Red Justicia* aims to empower the community through better legal understanding.

Red Justice Legal Institute of Bogor Regency is an organization engaged in legal aid and advocacy, established with the aim of providing legal services to the community, particularly to the economically disadvantaged. This institution focuses on upholding justice, empowering communities through legal education, and providing legal assistance in criminal, civil, and administrative cases. By prioritizing the principles of social justice and legal transparency, *Red Justice* plays an active role in defending the rights of people vulnerable to legal injustice. Based in Bogor Regency, this institution also collaborates with various parties, including government agencies, civil society organizations, and the media, to encourage the creation of a more just and pro-people legal system.

METHOD

A pretest-posttest was employed in this study's pre-experimental design for a single group. The study population consisted of 23 employees of the Red Justice Law Institute, Bogor Regency. The sampling technique was total sampling. Inclusion criteria were employees ≥ 20 years old, with no history of severe spinal disorders, and willing to participate. The intervention included six back exercise movements (shoulder roll rubber, back rubber, knee up, bridge pose, airplane, back up rubber) conducted 4 times per week for 3 weeks, with 30 minutes per session. The instrument used was the Straight Leg Raise (SLR) test. At a importance level of 0.05, the matched test t-test was utilized to analyze the information.

RESULTS AND DISCUSSION

Result

The following are the findings from a study named "The Effect of Back Exercise on Preventing *Low Back Pain* in Employees of the Red Justice Legal Institution Office in Bogor Regency".

Univariate Analysis

The data used in this study covers all employees working at the Red Justice Law Office in Bogor Regency, a total of 23 people. A more detailed explanation is presented in the following description.

Table 4.1 1Distribution of All Employees at the Red Justice Legal Institution Office, Bogor Regency Based on Gender, Age Group and Length of Service

Category	Group	Amount	Percentage (%)
Gender	Man	5	21.73
	Woman	18	78.27
Age Group	20–29 years	8	34.78
	30–39 years	14	60.87
	40 years and above	1	4.35
Length of work	1–2 years	5	21.74
	3–4 years	10	43.48
	5 years or more	8	34.78

Based on the findings of the Red Justice Legal Institution of Bogor Regency's employee data grouping, it is known that of the total of 23 employees, 5 people or 21.73% are male, while 18 people or 78.27 % are female. Viewed from the age group, of the 14 employees, representing 60.87% of the total, the majority are between the ages of 30 and 39, followed by the age group of 20-29 years as many as 8 people or 34.78%, and only 1 person or 4.35% who are 40 years old and above. Meanwhile, based on length of service, employees with a work period of 3-4 years dominate with a total of 10 people or 43.48%, followed by employees who have worked for 5 years or more as many as 8 people or 34.78%, and employees with a work period of 1-2 years as many as 5 people or 21.74%.

These data show that the composition of employees is relatively balanced between men and women, with a predominance of productive age and medium work experience which can be a potential for institutional performance.

Bivariate Analysis

Bivariate analysis aims to identify the relationship among two variables, specifically the independent and dependent variables, and to test the differences before and after treatment. In this study, the Red Justice Legal Institution of Bogor Regency staff members' complaints of low back pain severity were compared before and after engaging in back exercises using bivariate analysis, in addition to evaluating how these complaints relate to variables like age, gender, duration of service, body mass index (BMI), weight, exercise routines, repetition, workload, and work attitude.

Descriptive Statistical Test

The results of this test form the basis for interpretation in subsequent analyses. Table 1 displays the findings of the descriptive statistical tests.

Table 1 2Descriptive Statistical Tests
Paired Samples Statistics

	Mean	N	Standard Deviation	Std. Error Mean
Pair 1 pre_test	8.26	23	2,544	.531
post_test	13.13	23	1,140	.238

With 23 respondents (N), the pre-test mean is 8.26, the standard deviation is 2.544, and the standard error of the mean is 0.531, as shown in the table's descriptive statistical test results 4.2. In the interval, the post-test average value increased to 13.13 with a standard deviation of 1.140 and a standard error of the mean of 0.238.

This variety in cruel scores appears that the back workouts expanded scores some time recently (pre-test) and after (post-test). Since the post-test's standard deviation was lower

indicates that the post-intervention measurements were more consistent than before. This finding provides an initial indication that the exercises provided have the potential to positively impact the reduction of *low back pain*.

Normality Test

Normality test results in table 2

Table 2 Normality Test Results

Tests of Normality

data	category	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
	1	.168	23	.091	.929	23	.102
	2	.198	23	.020	.921	23	.071

a. Lilliefors Significance Correction

Considering the outcomes of the aforementioned Tests of Normality, it is known that for category 1 data (pre-test), the significance value is 0.102 in the Shapiro-Wilk test and 0.091 in the Kolmogorov-Smirnov test, both higher than 0.05. This suggests a regularly distributed pre-test data set. For category 2 data (post-test), the importance value in the Kolmogorov-Smirnov test is 0.020 (<0.05) which indicates non-normality, but in the Shapiro-Wilk test the significance value of 0.071 (>0.05) indicates a normal distribution. Since it is more advised to employ the Shapiro-Wilk test for tiny sample sizes (<50), both the pre-test and post-test data are found must be dispersed on a regular basis. Thus, parametric statistical tests, following the satisfaction of the assumption of normalcy, the research can proceed using tools like the paired sample t-test.

Homogeneity Test

The results of the homogeneity test are in table 3

**Table 3 Results of Homogeneity Test
Test of Homogeneity of Variances**

pre_test Levene Statistics	df1	df2	Sig.
.123	1	44	.728

Considering the outcomes of the *Homogeneity of Variances Test* in table 4.5 for the pre- test variable, the *Levene Statistic* value was obtained as 0.123 with degrees of freedom (df1) 1 and (df2) 44, and a significance value (Sig.) of 0.728.

Because the significance value of 0.728 is greater than 0.05 ($p > 0.05$) it is possible to argue that the variation between bunches is uniform or leads to. This means that the pre-test data meets the assumption of homogeneity of variance, so parametric statistical analysis can be continued without the need for method adjustments.

Correlation Test

The results of the correlation test are shown in table 4

Table 4 Correlation Test Results

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 pre_test post_test	&23	.254	.242

Considering the outcomes of *Paired Samples Correlations* , the number of respondents (N) was 23 people, with a significance value (Sig.) of 0.242, the correlation between the pre-test and post-test scores was 0.254.

The findings of the pre-test and post-test show a weak but positive link, as indicated by the correlation value of 0.254, meaning that respondents with high initial scores tend to have high final scores as well, although the relationship is not strong. A statistically insignificant association is shown by a significance value of 0.242 (> 0.05). As a result, the scientific conclusion that pre-test and post-test results are highly associated cannot be made.

Paired Simple t-Test

The results of the Paired Samples t- Test are in Table 5

Table 5 Results of the Paired Samples t- Test

	Paired Differences	Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1 pre_test post_test	--	4,870	2,510	.523	-5,955	-3,784	-9,304	22	.000

According to the Paired Sample t-Test results in Table 4.6, the pre-test and post-test scores differed by an average of -4.870, with a standard deviation of 2.510 and a standard error of 0.523. The average disparity, as seen by the 95% CI, is between - 5.955 and -3.784, both of which are negative. This suggests that the post-test findings consistently outperform the pre-test results.

A t-value of -9.304 with 22 degrees of freedom (df) yields a significance value (Sig (2-tailed)) of 0.000 (<0.05). This proposes that there's a significant contrast between the pre-test and post-test comes about. To put it another way, there is a noticeable difference between the Red Justice Legal Institution Office staff members before and after they started doing *back exercises* to avoid *low back pain*, Bogor Regency. These results indicate that the exercises provided have a positive and meaningful influence on improving the respondents' conditions.

Discussion

Overview of Low Back Pain in Employees at the Red Justice Legal Institution Office in Bogor Regency

Based on the findings of the Red Justice Legal Institution of Bogor Regency's employee data grouping, it is known that of the total of 23 employees, 5 people or 21.73% are male,

while 18 people or 78.27 % are female . When viewed from the age group, the majority of employees are in the 30-39 year range, namely 14 people (60.87%), followed by the 20-29 year age group as many as 8 people (34.78%), and only 1 person (4.35%) who is 40 years old and above. In terms of work period, employees with 3-4 years of experience dominate as many as 10 people (43.48%), followed by employees with 5 years of work period or more as many as 8 people (34.78%), and employees with 1-2 years of work period as many as 5 people (21.74%). This composition shows gender balance, dominance of productive age, and the proportion of medium work period that supports the operational effectiveness of the institution. Previous studies have confirmed that adequate demographic balance and work experience can increase productivity and performance efficiency in the work environment (Souza dkk., 2021)

The Effect of *Back Exercise* on Preventing *Low Back Pain* in Employees of the Red Justice Legal Institution in Bogor Regency

Low Back Pain (LBP) may be a common wellbeing issue, especially among workers who sit frequently or engage in repetitive physical activity. Employees at the Red Justice Law Office in Bogor Regency, the majority of whom sit for long periods, are at risk of experiencing LBP, which can disrupt productivity and quality of life. Therefore, interventions such as back exercises are crucial for preventing and alleviating LBP.

Based on the data obtained from this study, it was found that the average pre-test score of employees before performing back exercises was 8.26, while after the exercise, it increased significantly to 13.13. This increase in the average score indicates an improvement in physical condition and a decrease in complaints of lower back pain after the back exercise intervention. Additionally, the post-test's standard deviation number (1.140) was smaller than the pre-test's (2.544), which means that the post-test results were more consistent across respondents.

A small but positive correlation ($r = 0.254$) The correlation test revealed a relationship between the pre-test and post-test results, although it was not statistically significant ($p = 0.242$). This indicates that while there is a tendency for respondents with high initial scores to also have high final scores, the relationship is not strong enough to base scientific conclusions.

However, a highly significant difference between the pre-test and post-test scores was found by the paired sample t-test results ($t = -9.304$; $p < 0.05$). This demonstrates that back exercises were greatly beneficial in preventing and lowering office workers' complaints of low back discomfort.

These results are consistent with a number of other research studies that demonstrated the effectiveness of back workouts in reducing low back pain. Indri et al. in their study of lecturers and staff, demonstrated that back muscle strengthening exercises were effective in reducing back pain. Systematic and consistent exercise can improve muscle function, enhance posture, and reduce pressure on the spine.(Susilawati dkk., 2019)

Additionally, Parvianti and Prastowo reported that education on ergonomic work positions and the William Flexion Exercise significantly reduced low back pain (LBP) among employees in the craft sector. This exercise focuses on strengthening and stretching back muscles, which helps maintain flexibility and reduce muscle tension. These results support the importance of exercise-based interventions for workers with repetitive physical activities and static positions (Parvianti & Prastowo, 2025)

Another study by Santosa supports the argument that back exercises, particularly those targeting back muscle strengthening and stretching, can improve spinal health and reduce the risk of injury. This study also emphasizes the importance of regular exercise for optimal results (Santosa dkk., 2023)

Furthermore, research by Dewi found that a back exercise program implemented in an office setting significantly reduced low back pain (LBP) in the short term and potentially provided long-term benefits if implemented consistently. This demonstrates the relevance and necessity of physical intervention in work environments that require prolonged sitting (Dewi, 2024)

These findings and the body of research support the notion that using back workouts at work, particularly for employees at high risk of low back pain, is an effective and efficient preventative measure. These exercises not only improve physical condition and reduce pain complaints, but can also increase employee productivity and quality of life.

CONCLUSION

The comes about of the Ruddy Equity Legitimate Institution in Bogor Rule ponder on the Impact of Back Work out on the Avoidance of Moo Back Torment in Workers bolster the taking after conclusion: The cruel contrast (normal contrast) between the pre-test and post-test scores within the Combined Test t-Test was -4.870, with a standard deviation of 2.510 and a standard mistake cruel of 0.523. Agreeing to the 95% CI, the normal distinction is between -5.955 and 3.784, all of which are negative, illustrating that the post-test esteem reliably surpasses the pre-test esteem. With degrees of flexibility (df) 22 and a computed t esteem of -9.304, the centrality esteem (Sig (2-tailed)) is 0.000 (<0.05).

This suggests that the results of the pre-test and post-test differ significantly. In other words, the change between before and after was substantial the implementation of back exercises to prevent low back pain among employees of the Red Justice Legal Institute in Bogor Regency. These results indicate that the exercises provided had a positive and meaningful influence on enhancing the respondents' condition.

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