

“Developing a Physical Rehabilitation Therapy Model Using Back Exercise and Kinesiotaping to Reduce Pain in Individuals with Low Back Pain”

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ABSTRACT

Low Back Pain is a condition characterized by pain in the lower back muscles, commonly caused by excessive daily activities such as prolonged standing, lifting heavy loads, or sitting for extended periods. These activities can lead to muscle strain, while aging further contributes to decreased physical activity and mobility, resulting in weakened back and abdominal muscles. The prevalence of LBP in Indonesia is estimated at 18% and increases with age. Approximately 85% of LBP cases are nonspecific, often related to soft tissue abnormalities such as injuries, muscle spasms, or fatigue. To address these problems, interventions such as Back Exercise and Kinesio Taping can be applied. This study aimed to investigate the effectiveness of Back Exercise and Kinesio Taping in reducing pain among patients with LBP. This experimental research employed a pre-test and post-test group design, comparing pain intensity before and after a six-week intervention. From a total population of 15 participants screened based on inclusion and exclusion criteria, 10 participants were eligible and selected as the study sample. Pain levels were measured using the Visual Analogue Scale (VAS). The results of the paired comparison analysis showed a significant reduction in pain ($p = 0.003$, $p < 0.05$), indicating that Back Exercise and Kinesio Taping are effective in alleviating pain associated with Low Back Pain. This study demonstrates that the combination of Back Exercise and Kinesio Taping provides a significant reduction in pain among patients with Low Back Pain. The findings highlight the potential of integrating exercise-based rehabilitation with supportive taping techniques as a non-invasive and effective therapeutic approach. These results suggest that such interventions may be recommended as part of clinical management strategies to improve the quality of life of individuals suffering from Low Back Pain.

Keywords: Low Back Pain, Pain, Back Exercise, Kinesiotaping, Visual Analogue Scale

INTRODUCTION

Low back pain is a condition characterized by dysfunction of the muscles in the lower back area, typically caused by excessive daily activities such as prolonged standing, lifting heavy loads, and maintaining a sitting position for extended periods¹. Low back pain is recognized as one of the musculoskeletal disorders resulting from improper ergonomics. Its primary symptom is pain in the spinal region of the lower back. Generally, this pain occurs due to muscle strain and age-related changes, which gradually reduce physical activity and mobility. Low back pain is defined as a non-specific condition referring to acute or chronic pain and discomfort in the lumbosacral region, commonly caused by inflammation, degenerative processes, gynecological disorders, trauma, or metabolic disturbances². The pain is typically felt between the lower rib margins and the gluteal fold, specifically in the lumbar or lumbosacral region, and often radiates to the lower limbs. Low back pain lasting for more than six months is categorized as chronic³. This condition may lead to weakened back and abdominal muscles⁴.

The prevalence of low back pain in Indonesia is approximately 18% and is predicted to increase in line with population aging. Low back pain most commonly affects individuals in their second to early fourth decade of life. For example, data from the morbidity records of outpatients at RSUD Prof. Dr. W.Z. Johannes in East Nusa

Tenggara Province reported 1,371 cases of low back pain between January and December 2018. Approximately 85% of these cases were non-specific in nature, typically caused by abnormalities in soft tissues such as injury, muscle spasm, or muscular fatigue⁵.

Interventions commonly administered to reduce pain symptoms in individuals with low back pain include infrared therapy, transcutaneous electrical nerve stimulation (TENS), ultrasound therapy, back exercises, and the application of kinesiotaping. Back exercise is one of the earliest therapeutic training methods introduced to restore muscular strength, endurance, and flexibility of the back muscles⁶. Kinesiotaping, meanwhile, is a relatively recent taping technique designed to prevent or rehabilitate sports injuries. The tape is made of 100% cotton with elastic fibers and is latex-free, making it unlikely to cause skin allergies⁷.

Additionally, Zain reports that the kinesio tape material is water-resistant and can remain effective for three to five days depending on individual conditions. According to Kim (2017)⁹, kinesio taping is a rehabilitative technique used to facilitate the body's natural healing process while providing support and stability to muscles and joints without restricting range of motion. Kim further explains that kinesio taping can be applied to various neuromuscular and musculoskeletal problems. Developed by Kenzo Kase, this method integrates the principles of kinesiology with chiropractic techniques through the use of specialized elastic strips designed to mimic the density and elasticity of human skin.

Based on the existing background related to low back pain, several efforts can be undertaken, including health promotion (promotive), prevention (preventive), treatment (curative), and rehabilitation (rehabilitative) strategies. In addition to physiotherapeutic modalities, physiotherapy interventions may also involve manual therapy techniques such as Back Exercise and the application of kinesiotaping for individuals with low back pain. In this study, the researcher applied Back Exercise and kinesiotaping as therapeutic methods to reduce pain levels, measured using the Visual Analogue Scale (VAS), in individuals experiencing low back pain.

RESEARCH METHODOLOGY

This study employed an experimental one-group pretest–posttest design aimed at determining the effectiveness of physical rehabilitation therapy using the back exercise method and kinesiotaping in reducing pain among individuals with low back pain. The research was conducted at the Physiotherapy Laboratory in Padang City. A pretest–posttest approach was utilized to assess the extent to which the application of Back Exercise and Kinesiotaping influenced pain reduction. The data obtained were analyzed using ANOVA with SPSS Version 25.

The sample criteria included individuals experiencing lower back pain who had not undergone surgical procedures involving the lumbar region. A total of 10 participants met the inclusion criteria and were recruited for this study, all of whom reported lower back pain associated with low back pain.

RESULTS AND DISCUSSION

Result

Descriptive data were collected to provide an overview of the participants involved in this study and to ensure that the sample characteristics were clearly documented prior to the statistical analysis. These characteristics include age, height, body weight, and Body Mass Index (BMI), which are essential variables in studies related to musculoskeletal conditions, particularly low back pain, as they may influence physical function, biomechanical load, and treatment response. The descriptive statistics for the ten participants who met the inclusion criteria are presented in the table below.

	N	Mean \pm Std. Deviation	Std. Error
Age	10	24,2 \pm 1,77	0,54

Height	10	145,9 ± 11,21	3,43
Weight	10	54,6 ± 7,25	2,54
NMI	10	23,47 ± 3,26	1

Table 1. Characteristics of research subjects

Based on the table above, the results show that the mean age of the participants was 24.2 ± 1.77 years. This indicates that the age distribution was dominated by individuals aged 23 (n = 2), 24 (n = 1), 25 (n = 2), 26 (n = 1), and 30 years (n = 4). The mean height was 145.9 ± 11.21 cm, with participants' heights ranging from 125 cm to 170 cm. The mean body weight was 54.6 ± 7.25 kg, with a weight range of 45 kg to 75 kg. Meanwhile, the Body Mass Index (BMI) showed a mean value of 23.47 ± 3.26 .

Moreover, to obtain an overview of changes in pain intensity before and after the intervention, descriptive statistical analysis was conducted on the pretest and posttest Visual Analogue Scale (VAS) scores. This analysis provides information regarding the minimum and maximum values, mean scores, and standard deviations for both measurement points, allowing for an initial comparison of pain levels prior to and following the application of Back Exercise and kinesiotaping. The descriptive results for the ten participants are presented in the table below.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	10	4	8	6.30	1.252
Posttest	10	3	6	4.40	1.174
Valid N (listwise)	10				

Table 2. Pretest and Posttest Data

Before conducting further statistical analyses to determine the effectiveness of the intervention, a normality test was performed to assess whether the pretest and posttest data were normally distributed. Normality testing is essential in selecting the appropriate statistical procedures and ensuring the validity of the results. The Kolmogorov–Smirnov and Shapiro–Wilk tests were applied to evaluate the distribution of the data obtained from the Visual Analogue Scale (VAS) measurements. The results of the normality tests for both pretest and posttest scores are presented in the table below

Tests of Normality

Kelas	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Hasil						
Pretest	.205	10	.200*	.929	10	.436
Posttest	.195	10	.200*	.878	10	.124

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 3. Test Normality

The results of the normality test indicate that both the pretest and posttest data are normally distributed. This conclusion is based on the significance values (p-values) obtained from the Shapiro–Wilk test, where the pretest score yielded a p-value of 0.436 and the posttest score yielded a p-value of 0.124. Since all significance values are greater than 0.05, the data meet the assumption of normality. Thus, the dataset is considered suitable for parametric statistical analysis.

To further examine whether there was a statistically significant difference in pain scores between the pretest and posttest measurements, an independent samples t-test was conducted. Although the study design involved repeated measures on the same participants, the test was applied to compare mean differences while also evaluating the homogeneity of variances through Levene's Test. This analysis provides insight into whether the intervention which comprising Back Exercise and kinesiotaping, produced a meaningful reduction in pain intensity. The detailed output of the independent samples t-test is presented in the table below.

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper		
Hasil	.020	.890	3.501	18	.003	1.900	.543	.760	3.040
Equal variances assumed									
Equal variances not assumed			3.501	17.926	.003	1.900	.543	.760	3.040

Table 4. table Independent Samples Test

Based on the results of the independent samples t-test, the significance value (2-tailed) obtained was 0.003, which is lower than the threshold of 0.05. This indicates that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. In other words, there is a statistically significant difference between the pretest and posttest pain scores. The mean difference of 1.90 further supports the presence of a meaningful reduction in pain intensity following the intervention.

These results demonstrate that the combined therapy of Back Exercise and kinesiotaping has a significant positive effect on reducing pain levels in individuals with low back pain. The observed difference in mean scores suggests that the intervention contributed to improved functional outcomes and decreased discomfort, thereby supporting its therapeutic value in clinical practice.

Furthermore, the confidence interval of the mean difference, ranging from 0.760 to 3.040, does not cross zero, indicating consistency in the intervention's effect across participants. This strengthens the evidence that the reduction in pain was not due to random variation but was influenced directly by the therapeutic techniques applied. The effectiveness of Back Exercise in improving muscle strength and flexibility, combined with the supportive and proprioceptive effects of kinesiotaping, likely contributed to this positive result.

Therefore, the findings highlight the importance of incorporating structured exercise programs and taping techniques in physiotherapy interventions for low back pain. The significant outcomes observed in this study align with previous literature that emphasizes the role of strengthening exercises and kinesiotaping in reducing musculoskeletal pain and enhancing postural stability.

DISCUSSION

The findings of this study indicate that the combined intervention of Back Exercise and kinesiotaping produced a significant reduction in pain intensity among participants with low back pain. This aligns with existing literature showing that exercise-based rehabilitation plays an important role in restoring lumbar function and reducing musculoskeletal discomfort¹⁴. The significant p-value obtained in this study ($p < .003$) further confirms that the intervention exerted a measurable therapeutic effect, supporting the notion that strengthening and stabilizing the lumbar musculature is fundamental in low back pain management.

Back Exercise specifically targets the stabilizing muscles of the lumbar region, contributing to improved postural control, enhanced spinal alignment, and reduced mechanical stress. As Suharjana (2013, as cited in Wanti, 2023) notes, Back Exercise improves physiological fitness by facilitating nutrient transport within the body, decreasing the risk of joint and muscle injury, and strengthening both abdominal and back muscles¹⁵. Increased muscular strength and endurance help the body adapt more efficiently to static or dynamic loads, thereby minimizing excessive strain on the spinal structures. This theoretical framework supports the results of the current study, where participants reported decreased pain after engaging in Back Exercise routines.

The current findings are also consistent with previous research emphasizing the importance of lumbar stabilization training in reducing pain and disability. According to Richardson et al. (2002), targeting deep stabilizing muscles such as the transversus abdominis and multifidus enhances spinal stability and reduces recurrent episodes of low back pain¹⁶. By focusing on these stabilizer muscles, Back Exercise likely contributed to improved neuromuscular coordination, which plays a crucial role in attenuating pain perception during functional activities.

In addition to Back Exercise, kinesiotaping provided complementary therapeutic effects. Kinesiotaping is an elastic adhesive tape designed to mimic the elasticity of human skin, allowing for unrestricted movement while offering sensory input that facilitates muscle activation and joint support¹⁷. The tape's ability to remain effective for 3–5 days, combined with its water-resistant cotton fibers, makes it suitable for continuous therapeutic application. This characteristic allows prolonged proprioceptive stimulation, which may contribute to sustained pain reduction.

Kinesiotaping techniques vary based on therapeutic goals, ranging from muscle relaxation to enhanced muscle activation. As described by Lim and Tay (2015), Y-strip applications are typically used to relax overactive muscles, while I-strip techniques are commonly used to alleviate swelling and reduce pain¹⁸. The present study employed kinesiotaping techniques that align with these established procedures, thereby enhancing their therapeutic potential. When applied with appropriate tension—such as 15–25% for relaxation or up to 50% for activation—the tape influences neuromuscular responses by stimulating cutaneous mechanoreceptors, promoting functional movement, and reducing excessive muscle tension¹⁹.

The neuromuscular effects of kinesiotaping are also supported by previous studies showing improvements in proprioception, muscular activation, and postural stability. According to Williams et al. (2012), kinesiotaping helps modulate pain through the gate control mechanism, which decreases nociceptive input to the central nervous system²⁰. This mechanism may explain the reduced pain perception observed in the participants after kinesiotaping application. Furthermore, enhanced comfort and mobility, as reported by many users of kinesiotaping, contribute to more efficient movement patterns and reduced biomechanical strain during daily activities.

The combination of Back Exercise and kinesiotaping appears to produce synergistic benefits. Back Exercise strengthens the supporting musculature, while kinesiotaping provides additional support and sensory feedback during movement, creating an optimal environment for pain reduction and functional improvement. This synergy aligns with the findings of Parreira et al. (2014), who highlighted that multimodal interventions tend to yield greater outcomes in musculoskeletal rehabilitation compared to single-method approaches²¹. Thus, integrating exercise therapy with kinesiotaping enhances both immediate and longer-term therapeutic effects.

The statistical results from this study reinforce the effectiveness of the intervention. The paired sample t-test demonstrated a significant difference between pretest and posttest pain scores, indicating that the combined Back Exercise and kinesiotaping intervention successfully reduced low back pain. Considering that all participants showed improvements, the intervention demonstrates both practical and statistical significance. This finding is consistent with broader clinical evidence supporting exercise and taping as effective conservative treatments for low back pain¹⁶.

Overall, this study contributes to the growing body of literature emphasizing the value of non-invasive, exercise-based rehabilitation strategies for managing low back pain. The findings support the integration of Back Exercise and kinesiotaping in physiotherapy practice, particularly for individuals experiencing mild to moderate low back pain. Future research may benefit from larger sample sizes, longer intervention durations, and the inclusion of functional outcome measures to further evaluate the long-term efficacy of these therapeutic techniques.

CONCLUSION

Based on the findings and analysis of this study, it can be concluded that the application of Back Exercise and kinesiotaping is effective in reducing pain intensity among individuals experiencing low back pain. The intervention, which was administered twice weekly over an eight-week period, demonstrated a significant

influence on decreasing pain scores, indicating that the combined therapeutic approach provides measurable clinical benefits. Regular implementation of Back Exercise contributed to strengthening the core and lumbar stabilizing muscles, while kinesiotaping offered additional neuromuscular support and proprioceptive stimulation, thereby enhancing functional movement and reducing discomfort.

The results of this study support the use of non-invasive, exercise-based rehabilitation strategies as a viable option for managing low back pain, particularly among individuals with mild to moderate symptoms. The observed improvements highlight the importance of integrating structured exercise programs with supportive taping techniques to achieve optimal pain reduction and functional outcomes. Future studies with larger sample sizes, longer follow-up periods, and additional functional assessments are recommended to further validate these findings and explore the long-term benefits of combined Back Exercise and kinesiotaping interventions.

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