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The Difference in the Effects of Mini Squat on Balance Pad and Lunge Stabilization Focus on Improving Stabilization

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ABSTRACT

This study aimed to determine the differences in the effects of Mini Squat on Balance Pad exercise and Lunge with Focused Stabilization exercise on improving stabilization. The sample consisted of 40 participants, selected using a random sampling technique using a provided questionnaire. The sample was divided into two treatment groups: Treatment Group I, consisting of 20 participants, received the Mini Squat on Balance Pad exercise, and Treatment Group II, consisting of 20 participants, received the Lunge with Focused Stabilization exercise. Method: This study used a quasi-experimental pre-post test design. Statistical analysis used the Related T-Test and Independent T-Test. The results of the homogeneity test for the treatment groups before exercise showed a p-value of 0.008. The Related T-Test results for Treatment Group I showed a p-value of 0.001, and for Treatment Group II, a p-value of 0.001, indicating that the exercises given to each group had an effect on improving stabilization. The results of the Independent T-Test showed a p-value of 0.001, indicating a highly significant effect between treatment group I and treatment group II. It can be concluded that there is a highly significant difference in the effects of the Mini Squat on Balance Pad exercise and the Lunge with Focused Stabilization exercise on improving stabilization. This study recommends applying the training method with the correct procedure, and performing it over a period of more than one month. Improved stabilization results will be better if performed over a period of 2-3 months. It is also hoped that factors that could influence the research results can be minimized to achieve optimal results.

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INTRODUCTION

Body stabilization is an important aspect of various physical activities, both in sports and everyday life. Good balance helps prevent injury and improves movement performance. In rehabilitation and fitness, stability-focused exercises are increasingly being implemented to improve postural control and core strength. Mini squats on a balance pad and lunges with a stability focus are two common exercises used in stabilization programs. Mini squats on a balance pad are exercises that target the core and lower extremity muscles with the added challenge of an unstable surface. Meanwhile, lunges with stability focus exercises emphasize muscle strengthening by maintaining balance in dynamic positions. Although both exercises

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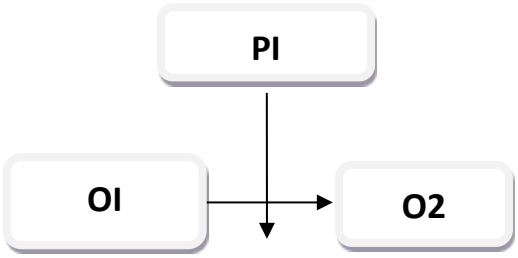
have benefits for improving stabilization, there is still little research comparing their effectiveness. Therefore, this study aims to evaluate the differences in the effects of mini squats on balance pad exercises and lunges with stability focus exercises on improving stabilization. This research is expected to contribute to the field of fitness and rehabilitation and increase understanding of more optimal training strategies in improving body stabilization. In accordance with KEPMENKES 1363 of 2008 Chapter 1, Article 1 paragraph 2, it is stated that: "Physiotherapy is a form of health service aimed at individuals and/or groups to develop, maintain and restore movement and body function throughout the life span by using manual handling, movement enhancement, equipment (physical, electrotherapeutic and mechanical), functional training and communication."

RESEARCH METHODOLOGY

This research method is quasi-experimental, observing the causal correlation phenomenon in both treatment groups of the research subjects. The study also aims to examine the differences in the effects of adding the Mini Squat on Balance Pad Exercise to the Lunge with Focused Stabilization Exercise on improving stabilization. The study used a pre-test/post-test control group design. The subjects were divided into two groups. The first treatment group was given the Mini Squat on Balance Pad Exercise, while the second treatment group was given the Lunge with Focused Stabilization Exercise. The purpose of this study was to examine the differences between the Mini Squat on Balance Pad Exercise and the Lunge with Focused Stabilization Exercise on improving stabilization. Dynamic stabilization was measured using the Dynamic Postural Stability Index (DPSI). The results of the dynamic stabilization measurements will be analyzed and compared between the first and second treatment groups. a) Treatment Group I: In Group I, the Dynamic Postural Stability Index (DPSI) was measured before the exercise. Afterward, the subjects were given the Mini Squat on Balance Pad Exercise. At the end of the study, the results of the measurement of the improvement in stabilization were evaluated.

Scheme 1. Treatment Group I



Description:
PI: Mini Squat on Balance Pad
OI: Stabilization Ability Before Mini Squat on Balance Pad Exercise
O2: Improved Stabilization After Mini Squat on Balance Pad Exercise

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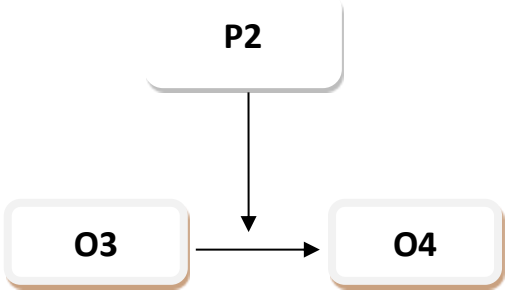
Scheme 2. Treatment Group II



Description:
PI: Lunge with Focused Stabilization
O3: Stabilization Ability Before Lunge with Focused Stabilization Exercise
O4: Improved Stabilization After Lunge with Focused Stabilization Exercise

RESEARCH RESULTS AND DISCUSSION

Analysis Requirements Test

Data Normality and Homogeneity Test. This data normality test was conducted to determine whether the research sample came from a normally distributed population. Since the study's sample size was small, less than 30 individuals, the Shapiro-Wilk Test was used to test for normality.

Table 4.6 Normality Test (Shapiro-Wilk Test) and Homogeneity Test (Levene's Test)

Variable	p-value *Shapiro Wilk Test*	Description	p-value Levene's test	Description
Sebelum I	0,300	Normal		
Sesudah I	0,727	Normal		
Sebelum II	0,221	Normal	0,008	Homogen (>0,05)
Sesudah II	0,903	Normal		
Selisih I	0,441	Normal		
Selisih II	0,318	Normal		

Based on Table 4.6, the results of the normality and homogeneity tests for treatment group I and treatment group II show a statistical test result using Levene's Test for treatment group I and treatment group II, with a p-value of 0.008, indicating a homogenous sample. To see the distribution of initial stabilization values in treatment group I and treatment group II, see Table 4.7 below.

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Table 4.7 Initial dynamic stabilization values before the Mini Squat on Balance Pad exercise and the Lunge with Focused Stabilization exercise in treatment groups I and II.

Sampel	Treatment Group I	Treatment Group II
1	88	66
2	74	77
3	53	85
4	98	92
5	94	88
6	64	64
7	88	88
8	68	56
9	94	94
10	68	68
Mean	78,90	77,80
SD	15,42	13,43

Based on the data in table 4.7, the results of the homogeneity test calculation in treatment group I and treatment group II obtained statistical test results with Levene's test in treatment group I and treatment group II, namely p value = 0.008 where p < α value (0.05) which means Ho is rejected so that at the beginning of the study between treatment group I and treatment group II there was a significant difference in the level of stabilization so that it can be concluded that the data is not homogeneous.

Table 4.8 Initial dynamic stabilization values after Mini Squat on Balance Pad exercise and Lunge with Focused Stabilization exercise in treatment group I and treatment group II

Sampel	Treatment Group I	Treatment Group II
1	102	80
2	98	90
3	78	97
4	114	107
5	120	108
6	98	78
7	103	104
8	95	67
9	118	117
10	90	88
Mean	101,60	93,60
SD	13,01	15,75

Based on the data in table 4.8, the results of the homogeneity test calculations in treatment group I and treatment group II, the statistical test results obtained with the Levene's test in treatment group I and treatment group II were p-value = 0.009 where p < α value (0.05) which means Ho was rejected so that at the beginning of the study between the

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groups.Treatment I and treatment II groups showed a significant difference in the level of stabilization so it can be concluded that the data is not homogeneous.

Hypothesis Testing

This study has three hypotheses, each of which is tested to determine whether there is a difference in stabilization before and after treatment groups I and II. Furthermore, the researchers wanted to determine whether there was a difference in results between treatment group I, which received the Mini Squat on Balance Pad exercise, and treatment group II, which received the Lunge with Focused Stabilization exercise. The three tests are as follows:

Hypothesis I Test: Using the Related T-Test because the two data samples in treatment group I are paired. Hypothesis testing accepts Ho if the p-value is greater than 0.05, while Ho is rejected if the p-value is less than 0.05. The following hypotheses are supported:

Table 4.9 Data before and after in treatment group I

Sampel	Treatment Group I	Treatment Group II
1	88	102
2	74	98
3	53	78
4	98	114
5	94	120
6	64	98
7	88	103
8	68	95
9	94	118
10	68	90
Mean	78,90	101,60
SD	15,42	13,01

Based on the results of the T-Test Related data in treatment group I, the p-value was obtained = 0.001 where p < α value (0.05), this means that Ho is rejected so that there is an increase in stabilization in the Mini Squat On Balance Pad exercise.

Hypothesis Test II: Using the T-Test Related test because the two data samples in treatment group II are paired. With the hypothesis test, Ho is accepted if the p-value > α value (0.05) while Ho is rejected if p < α value (0.05). The hypotheses that are upheld are:

Table 4.10 Data before and after in treatment group II

Sampel	Treatment Group I	Treatment Group II
1	66	80
2	77	90
3	85	97
4	92	107
5	88	108
6	64	78
7	88	104

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Sampel	Treatment Group I	Treatment Group II
8	56	67
9	94	117
10	68	88
Mean	77,80	93,80
SD	13,43	15,75

Based on the results of the T-Test, the related data in the group obtained a p-value of 0.001, where p < α (0.05), meaning that Ho is rejected. This indicates an increase in stabilization in the Lunge With Focused Stabilization exercise.

Hypothesis Testing III: Using the Independent Sample T-Test because the two data samples in treatment group I and treatment group II are paired. Hypothesis testing Ho is accepted if the p-value is greater than α (0.05), while Ho is rejected if the p-value is less than α (0.05).

Table 4.11 Post-treatment data in treatment group I and treatment group II

Sampel	Treatment Group I	Treatment Group II
1	102	80
2	98	90
3	78	97
4	114	107
5	120	108
6	98	78
7	103	104
8	95	67
9	118	117
10	90	88
Mean	101,60	93,60
SD	13,01	15,75

Based on the results of the Independent Sample T-Test, the p-value was 0.008, where p <α (0.05), meaning Ho was rejected. Based on this, there is a difference in the effects of the Mini Squat On Balance Pad exercise and the Lunge With Focused Stabilization exercise on improving stabilization.

Based on the results of the statistical test of the data between the two treatment groups, the following conclusions can be drawn:

1. Hypothesis I: "Mini Squat on Balance Pad exercise can improve stabilization" with a p-value of 0.001 (p<0.05).
2. Hypothesis II: "Lunge with Focused Stabilization exercise can improve stabilization" with a p-value of 0.001 (p>0.05).
3. Hypothesis III: "Mini Squat on Balance Pad exercise with Lunge with Focused Stabilization exercise can improve stabilization" with a p-value of 0.008 (p<0.05).

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Discussion

A. Research Results: The results of this one-month study indicate that the sample's stabilization has significantly improved. The increased stabilization value can be measured using the Dynamic Postural Stability Index (DPSI) using anterior-posterior (AP), medial-lateral (ML), and vertical (V) movement tests. After the measurements, the stabilization values were obtained and the hypotheses were tested. This study had three hypotheses, each of which was tested to determine whether there was a difference in stabilization improvement before and after the Mini Squat on Balance Pad Exercise and Lunge with Focused Stabilization Exercise in treatment group I and treatment group II. Hypothesis I was tested using a Related T-Test in treatment group I, with a p-value of 0.001, and the hypothesis Ho was rejected if p <0.05. Hypothesis II was tested.

Using the related T-Test test in treatment group II, the p value = 0.001 was obtained with the hypothesis testing Ho rejected if p < value (0.05). In the hypothesis test III using the Independent sample T-test in treatment group I and treatment group II, the p value = 0.008 was obtained with the hypothesis testing Ho rejected if p < value (0.05). However, in the hypothesis test III, it turned out that the p value > value (0.05) which means Ho was accepted. In other relevant studies, it turned out that the coefficient calculation value to test the difference between treatment group I and treatment group II, the average hypothesis result was (p < 0.05). In other studies, it was shown that the stabilization value in DPSI measurements was much better than the test with single-leg standing. "The one-way ANOVA and post hoc comparisons demonstrated that dynamic postural stability scores were significant" (Journal of Physical Therapy in sport 2011). In this study, several samples met specific criteria for the study. Researchers needed to know their sports activities, such as jogging, cycling, and fitness. They also needed to know about any injuries the samples had experienced. In this study, the samples were not allowed to have any injuries such as spinal injuries, knee injuries, neurological disorders, fractures, or other conditions. This would be dangerous for those with injuries. Essentially, this study was specifically designed for healthy people who like and enjoy exercising. In addition, researchers also asked about the weight and height of the samples. Because it is in accordance with the criteria of women and men with a height between 155-170 cm. And a body weight of 50-70 kg. The samples in doing stabilization exercises in exercise are much more significantly improved because the Mini Squat On Balance Pad exercise expends a lot of energy in the body, can increase the strength of the lower leg muscles, gluteus muscles, and control directed movements, as well as the movements are more numerous and very unique and when finished the exercise is measured with DPSI (Dynamic Postural Stability Index) the jump results are much improved. Many techniques and methods are used to improve movement stabilization, one of which is by giving the Mini Squat On Balance Pad exercise and Lunge With Focused Stabilization exercise. In this study, researchers want to see

The impact of the Mini Squat On Balance Pad exercise and Lunge With Focused Stabilization exercise used to improve stabilization. The samples obtained were divided into two groups, namely 10 people in treatment group I who were given the Mini Squat On Balance Pad exercise and 10 people in treatment group II who were given the Lunge With

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Focused Stabilization exercise on improving stabilization. After conducting the study for one month, the results showed that there was a difference in the increase in stabilization between treatment group I who were given the Mini Squat On Balance Pad exercise and treatment group II who were given the Lunge With Focused Stabilization exercise. Where the provision of Mini Squat On Balance Pad exercise had a greater effect than Lunge With Focused Stabilization exercise on improving stabilization. In treatment group I, "there is an effect of increasing stabilization on the provision of Mini Squat On Balance Pad exercise". As for hypothesis I, a related t-test was used with a sample of 10 people and stabilization measurements using DPSI (Dynamic Postural Stability Index) and a midline measuring instrument obtained an increase that occurred at the end of each second week. At the beginning before the provision of exercise, the value of stabilization ability in

treatment group I with a mean value of 78.90 and a standard deviation value of 15.42 and at the end of the study there was an increase in stabilization with a mean value of 101.60 and a standard deviation value of 13.01 with a P value = 0.001 (p <0.05) which means there was a significant increase in stabilization. While in the results of hypothesis II, treatment group II given Lunge With Stabilization Focus exercise experienced an increase in stabilization. At the beginning before the exercise was given, the initial DPSI (Dynamic Postural Stability Index) value in treatment group II had a mean value of 77.80 and a standard deviation value of 13.43 and at the end of the study there was an increase in stabilization with a mean value of 93.60 and a standard deviation value of 15.75. With a p value = 0.001 (p <0.05) which means there was a significant increase in stabilization. Based on the data above, it is known that in treatment group I and treatment group II there was an increase in stabilization. However, based on the results of the two mean difference test with the independent t-test on hypothesis III, the p value was obtained = 0.008 (p < 0.05), which means there was a difference in the increase in stabilization between the groups.

Treatment I and Treatment II. This is because the effects of the two exercises above are different. Essentially, the Mini Squat On Balance Pad exercise and the Lunge With Focused Stabilization exercise use the same principle in providing training dosage. These two exercises are performed 12 times with a progressive overload training dosage aimed at increasing stabilization. This exercise is influenced by the time or duration of training after being given the exercise between Treatment I and Treatment II groups with each group of different samples and varying levels of stabilization, this is related to the different age levels of the samples. In the fourth or final week, the measurement results from all samples in each group showed a very significant increase in stabilization. In this research on stabilization, there are many interesting samples because there are several samples whose dynamic stabilization values fluctuate due to their poor physical condition, these samples do not exercise regularly so that many factors influence the fluctuations in the stabilization values. There are also samples whose vertical movements are measured at 25cm from the height of the body even though their height is 155cm but the results of their jumps are quite far, while those with a height of 165cm have the same results.

The jump is not very high, about 7 cm from the height of the body. In addition, there are also samples that when measured anterior-posterior (AP) and medial-lateral (ML)

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movements, the jump results are further than when the medial-lateral (ML) movement. Limitations During the course of the study, researchers encountered limitations in conducting this study. Limitations that occurred during the study include: 1. The seriousness of the samples during the study. There were several samples who did not train seriously, resulting in suboptimal training. 2. The level of discipline of the samples in training was very low, resulting in unequal levels of dynamic stabilization of the samples. 3. Sample activities that were difficult for researchers to predict in the field of daily sports because sports greatly affect the results of the training given. 4. This study was conducted during the fasting month so that the physical condition of the samples was less than optimal.

CONCLUSION

Based on the research results and discussion above, the following conclusions can be drawn: 1. Training with the Mini Squat on Balance Pad Exercise can improve stabilization. Training with the Lunge with Focused Stabilization Exercise can improve stabilization. There is a difference in stabilization between the Mini Squat on Balance Pad Exercise and the Lunge with Focused Stabilization Exercise. To improve stabilization ability, the training provided will have a more meaningful effect if it is performed regularly and with discipline for four weeks, with a progressive overload dose, with subjects not experiencing fatigue, and attention to the angle of movement during the training. Suggestions: Based on the research results, it is hoped that the training method can be applied with the correct procedures to achieve optimal results. When providing training, physiotherapists must pay attention to the physical condition of the subjects being trained. This is necessary to identify signs of fatigue and potential injuries. It is hoped that fellow physiotherapists and students will develop further research on this method. This should be conducted over a period of more than one month, as improvements in dynamic stabilization will yield better results if implemented over a period of 2-3 months. To achieve optimal results, it is hoped that the training method can be applied with the correct procedures and that factors that could affect the research results can be minimized to achieve optimal results.

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