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Differences In the Effect Between Balance Training And Strengthening Exercises On Pain And Functional Ability In Patients With Genu Osteoarthritis

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Abstract

Objective: to determine whether there is a difference in the effect between balance training and strengthening exercises on pain and functional ability in knee osteoarthritis. **Design:** two group pre-test and post-test. **Subjects & Treatments:** 16 patients (n=16) with knee osteoarthritis who met the study criteria were divided into 2 groups. Group I was given balance training while group II was given strengthening training. Each was treated 12 times, 2 times a week. **Place of Study:** Physiotherapy Room, Medical Rehabilitation Installation of RSUD 45 Kuningan. **Time:** November 7, 2022 to February 15, 2023. **Measurement Tools:** WOMAC Index. **Analysis:** Non parametric test, Wilcoxon & Mann Whitney Test. **Results:** Wilcoxon pre-post pain test of group I showed $p = 0.020$ ($p < 0.05$) and Wilcoxon pre -post functional ability test showed $p = 0.101$ ($p > 0.05$) which means there is an effect of providing balance training on pain but no effect on functional ability. The Wilcoxon pre-post pain test for group II showed $p = 0.016$ ($p < 0.05$) and the Wilcoxon pre -post functional ability test showed $p = 0.119$ ($p > 0.05$) which means there is an effect of strengthening exercises on pain but no effect on functional ability. Mann Whitney test of pain between the two groups showed $p = 0.832$ ($p > 0.05$) and functional ability showed $p = 0.713$ ($p > 0.05$) which means there is no difference in effect between treatment groups I and II. **Conclusion** There is no difference in the effect between balance training and strengthening exercises on pain and functional ability in knee osteoarthritis.





Keywords: Knee Osteoarthritis, Balance Training, Strengthening Exercise, Pain, Functional Ability, WOMAC Index

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1. Introduction

Osteoarthritis (OA) is a disease that is often found and progresses slowly at the end of a person's life. The character of clinical complaints is pain, deformity, limitation of motion and usually progressive joint destruction and resulting disability.

From the epidemiological picture, about 6% of adults aged 30 years and 13% of people aged 60 years have complaints of knee pain and radiographically found OA. Although OA commonly occurs in the knee, the prevalence sometimes also affects the hand, especially the distal and proximal interphalangeal joints and the base of the thumb. It is estimated that by 2020, the number of people suffering from OA will double. Osteoarthritis is an early cause of disability in the elderly.

The main barriers for patients with OA knee disorders are walking, climbing stairs and moving from sitting to standing. Decreased balance and muscle strength were also found in those aged > 65 years with chronic knee pain after 30 months. Moreover, the greatest ankle and knee muscle strength is associated with good balance. Quadricep muscle weakness is also a risk factor for knee OA. Decreased balance was also found in patients with knee pain when compared with age, gender, and body mass as controls.

Studies link the effectiveness of exercise therapy to reducing OA pain and improving functional ability in OA patients. In Australia it was reported that the effects of strengthening exercise therapy and functional exercise therapy were more effective than no therapy. Standing balance training should be an important part of an exercise program to increase functional ability in patients with knee OA. Standing balance training is an alternative exercise related to knee OA in addition to muscle strengthening exercises.

On the basis of the above research, it can be concluded that balance training and strengthening exercises can be given to knee OA patients. Therefore, the researchers in





the preparation of this thesis want to compare the effectiveness between balance training and strengthening exercises on pain and functional knee OA.

2. Methods

This research is a quantitative method with a type of quasi experiment. The design of this study was the two group pre test and post test design, to determine the benefits of balance training and strengthening exercises on reducing pain and improving the functional abilities of patients with osteoarthritis of the knee joint. In this study, two groups of research subjects were used, namely: (1) Treatment group I which is given balance training, 3x a week, for 4 weeks, (2) Treatment group II which is given strengthening exercises, 2 x a week, for 5 weeks.

The population in this study were all knee osteoarthritis patients at the Physiotherapy Polyclinic of RSU 45 Kuningan who met the criteria. The number of patients who met the research criteria was 16 people. Of the 16 patients who met the research criteria, there were 8 patients.

The data collection technique in this study went through two stages, namely before being given action or treatment in both treatment groups (pre test) and the stage after 5 weeks of action or treatment in both treatment groups (post test). For two groups of research subjects; (1) Treatment group I which was given balance training, 3x a week, for 4 weeks; (2) Treatment group II which was given strengthening exercises, 2 x a week, for 5 weeks. In this study, pain and functional ability evaluation tools with the WOMAC Index at the beginning and end of the study.

In this study, the data analysis techniques used were univariate analysis and bivariate analysis. In bivariate analysis, the test for differences in pain and functional ability used Mann-Whitney and Wilcoxon.

3. Results and Discussion

The subjects of this study were patients with knee OA who had been diagnosed by a doctor and referred to the physiotherapy clinic, in the period July to October 2023 at RSUD 45 Kuningan, West Java. In this study period, the number of patients who met the research





criteria was 16 people (n=16). Of the 16 patients who met the research criteria, 8 patients (n = 8) were given balance training treatment as treatment group I and 8 patients (n = 8) were given strengthening training treatment as treatment group II.

In the univariate results obtained gender in treatment group I was 1 male (12.5%) and 7 women (87.5%). In treatment group II, there were 8 women (100%). For the age range in the study subjects ranged from 34 - 58. In treatment group I, there were 3 people aged between 51 - 55 years (37.5%), 1 person aged between 56 - 60 years (12.5%), 2 people aged between 61 - 65 (25%) and 2 people aged 66 - 70 years (25%). In treatment group II, there were 2 people aged between 51 - 55 years (25%), 2 people aged between 61- 65 (25%), 3 people aged between 66 - 70 years (37.5%), and 1 person aged between 71 - 75 years (12.5%). The level of education in treatment group I, 2 people (25%) had elementary level education, 4 people (50%) had advanced level education and 2 people (25%) had college education. In treatment group II, 3 people (37.5%) had primary level education, 4 people (50%) had secondary level education and 1 person (12.5%) had tertiary education.

For BMI (Body Mass Index), 2 people (12.5%) had normal BMI, 7 people (43.75%) had normal BMI and 7 people (43.75%) had overweight BMI. There are no (0.0%) who have obese BMI. For the location of complaints in treatment group I, there were 4 people with right knee (50%) and 4 people with left knee (50%). In treatment group II, there were 4 right knees (50%) and 4 left knees (50%). For the dominant activities carried out by respondents, at work there were no (0.0%) who did standing activities and others for treatment group I, and no (0.0%) who did sitting activities, going up and down stairs and others. The total subjects who did sitting activities were 3 people (18.75%), walking activities were 9 people (56.25%), sitting to standing activities (3 people and up and down stairs activities 1 person (6.25%).

The results of statistical analysis on the pain difference test in treatment group I using the Wilcoxon Test obtained a significance value of $p = 0.020$, meaning that balance training has an effect on pain reduction. This is in accordance with the theory of Kuntono (2010) that central and peripheral balance training will stimulate proprioceptors to





maintain a condition of cocontraction which will increase the strength of the agonist and antagonist muscle groups of the knee joint. Cocontraction will also provide stability and will increase the speed of arthrokinematic reactions in maintaining each movement. Peripheral reactions will provide feedback to the central balance and there will be a balance of motor pathways. For the results of statistical tests on functional ability treatment I using the Wilcoxon Test is $p = 0.101$. It can be concluded that balance training does not have a significant effect on functional ability. This is not in line with the theory proposed by Janet & Roberta (1987) that balance is dynamic, never static, and balance training should allow to regain the dynamic components that are important for each individual function.

From the results of statistical tests in treatment group II using Wilcoxon, a significance value of $p = 0.016$ was obtained, this means that the provision of strengthening exercises can have an effect on pain reduction. This is in line with the statement of Kuntono (2010) that quadricep muscle strengthening exercises will increase the activation of afferent nerve fibers Ib from the golgi tendon of the quadricep muscle which serves to inhibit nociceptor activation in the spinal cord Posterior Horn sensory cells. The probability value of functional ability for treatment group II is 0.119. It can be concluded that strengthening exercises do not have a significant effect on functional ability.

The results of the analysis using the Mann-Whitney Test on the effect of balance training and strengthening exercises on reducing pain and improving functional abilities, between treatment group I and treatment II obtained probability results of 0.832 for pain and 0.713 for functional abilities. So it can be concluded that there is no difference in treatment group I (balance training) and treatment group II (strengthening exercises) on pain and functional ability of knee osteoarthritis. The conclusion was decided based on the p value <0.05 , so H_0 is accepted, meaning that there is no significant difference between treatment group I and treatment group II on pain reduction and functional ability improvement. In the study of knee osteoarthritis using the WOMAC Index as a parameter, it was found that balance training and quadricep muscle strengthening exercises did not





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provide a significant difference in effect on pain reduction and functional ability improvement.

4. Conclusion

The conclusion of the study Differences in the Effect Between Balance Training and Strengthening Exercises on Pain and Functional Ability in Osteoarthritis of the Knee in the Physiotherapy Poly Room of RSUD 45 Kuningan, West Java. Resulting in the conclusion that the provision of balance training can reduce pain but cannot improve functional ability in knee OA. Giving strengthening exercises can reduce pain but cannot improve functional ability in knee OA. And there is no difference in the effect of providing balance training and strengthening exercises on reducing pain and increasing functional ability in OA knee.

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