

The Effect of Giving Core Stability Exercises to Changes in Pain and Functional Activity in Osteoarthritis Knee Joint Conditions

Sulfandi^{1*}, Azliyana Azizan², Asri Nining Pertiwi³

¹Physiotherapy Study Program, Institute of Health Technology and Science, Wiyata Husada Samarinda, Samarinda Indonesia

²Centre for Physiotherapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, 42300 Puncak Alam, Selangor Malaysia

Email corresponding authors: sulfandi@itkeswhs.ac.id.

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Abstract

Aims: Destruction and loss of cartilage on the joint surfaces. Pain is the dominant symptom and has an impact on functional activity which is also associated with a decrease in the ability of muscles to maintain stability and protect structures in the knee joint.

Objective: Knowing the effect of giving core stability exercise on changes in pain and functional activity in osteoarthritis knee joint conditions.

Methods: This study applied a pre-experimental one group pre-post test design method, with 17 respondents diagnosed with osteoarthritis of the knee, given core stability exercise with a frequency of 2 times / week for 1 month. The measurement instrument used to evaluate pain and functional activity is the knee injury osteoarthritis outcome score (KOOS).

Results: The results of this study indicate that the P-value = 0.000

Conclusion: the provision of core stability exercise has an effect on the process of changing pain and functional activity in osteoarthritis knee joint conditions.

Keywords: Core Stability Exercise; Functional Activity; KOOS; Osteoarthritis Knee

Introduction

Osteoarthritis (OA) is a term for degenerative joint disease resulting from progressive deterioration and loss of cartilage on the joint surfaces [1][2]. The pathology of OA knee affects the entire joint, causing synovial inflammation, articular cartilage destruction, bone remodeling, and osteophyte formation [3][4]. OA of the knee is one of the contributing factors to chronic pain and disability that is prevalent in many parts of the world[5]. It ranks as the 10th largest contributor to disability[3], especially in older adults, with an estimated 10%-15% of those over 60 years of age suffering from some degree of OA. Based on the 2015 GBD collaborators on the incidence and prevalence of diseases and injuries knee OA accounts for about 85% more than other types of OA worldwide [6]. The prevalence of knee OA in Europe

is mostly found in those over 55 years of age at 29% in women and 16% in men and least in those over 22 years of age at 14% in women and 12% in men [7]. In Indonesia, the number of individuals who experience OA reaches 36.5 million people, where 40% of the population over the age of 70 years experience this OA condition. They experience limitations in movement to varying degrees, from mild to severe [8,28]. The prevalence of OA knee in the East Kalimantan region in 2018 reached 8.12%, while in Samarinda City, based on doctor's diagnosis, the figure was 4.78% [9]. With an ever-increasing elderly population, the treatment of OA has become a major problem to be faced [10]. There are many risk factors for the occurrence of OA including age, obesity, previous injury, occupation, exercise and female gender [11][12].

OA knee is characterized by morning stiffness, reduced range of motion, crepitus, joint instability, swelling, muscle weakness, fatigue and pain associated with psychological stress is also often found in patients with OA knee. Pain in OA knee is usually intermittent pain especially when bearing mechanical loads [7]. Pain is also associated with a decrease in the ability of muscles to maintain stability and protect structures in the knee joint [13][14]. The implication of OA knee pain is reduced functional activity, especially difficulty getting up from sitting, walking, going up and down stairs. If the patient is inactive and reluctant to do exercises, the muscles can decrease in size which will have a negative impact on joint stability and function [15,25].

International guidelines methodologically strongly recommend non-pharmacological strategies as first-line treatment for knee OA [3]. With the right exercise program, it will restore muscle strength which is proven to potentially protect the joint from pathological stressors [16]. The core provides the foundation on which the muscles of the lower extremities generate or hold strength. Some of the muscles that act on the knee joint originate from the lumbopelvic region [13,26]. Core stability exercise describes the skill of controlling the position and central movement of the body which is useful in maintaining optimal posture during movement and acts as a foundation for all movements in the legs. This indicates that by maintaining optimal postural stability, especially the activation of core muscles, mobility in the upper and lower limbs can be performed efficiently [15]. Some of the muscles that work in the knee joint come from the muscles in the lumbopelvic. By providing core stability, it can increase muscle strength, especially core muscles, quadriceps muscle group, hip abductor, hip adductor where these muscles contribute the greatest stability to the knee [13,27].

Based on the background explanation above, it becomes the basis for researchers to conduct research on the effect of giving core stability exercise on changes in pain and functional activity in osteoarthritis knee joint conditions which are expected as references or considerations in deciding holistic or multidimensional interventions in osteoarthritis knee joint conditions.

Methods

This study applied the pre-experimental method of one group pre-test post-test design. Conducted in the Physiotherapy Poly of Samarinda Tk.IV Hospital in May-June 2023, with 17 respondents. Each respondent was given a core stability exercise intervention in the form of wall squad and bridging which was carried out for 30 seconds, 8 repetitions with therapy sessions every 2 times / week for 4 weeks.

The respondents of this study were knee OA patients, aged 40 to 65 years, male and female. The knee injury osteoarthritis outcome score (KOOS) was used to evaluate pain and functional activity.

Results

Table 1. Respondent Characteristic

Respondent Characteristics	Frequency	Percentage (%)
Gender		
Male	6	35.3
Female	11	64.7
Total	17	100
Age (years)		
40–45	2	11.8
46–50	2	11.8
51–55	4	23.5
56–60	4	23.5
61–65	5	29.4
Total	17	100
Occupation		
Entrepreneur	7	41.2
Housewife	5	29.4
Private Employee	3	17.6
Civil Servant	2	11.8
Total	17	100
Body Mass Index (BMI)		
Normal	4	23.5
Overweight	5	29.4
Obese	8	47.1
Total	17	100

Shows that the number of female respondents reached 11 people (64.7%) compared to only 6 male respondents (35.3%). Based on the age group suffering from OA knee age 40-45 years 2 people (11.8%), age 46-50 years 2 people (11.8%), age 51-55 years 4 people (23.5%), age 56-60 years 4 people (23.5%) and age 61-65 years 5 people (29.4%). Thus it shows that 61-65 years of age suffer more OA. Based on the type of work of the respondents, most of them were entrepreneurs as many as 7 people (41.2%), housewives as many as 5 people (29.4%), private sector about 3 people (17.6%), from civil servants about 2 people (11.8%). Based on the criteria for body mass index suffering from OA knee, the obesity category is more numerous at 8 people (47.1%) compared to normal category respondents only 4 people (23.5%) (Table 1).

Table 2. Pain and Functional Activity Measurement Scale

Category	Pre-Test		Post-Test	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Mild	0	0	10	58.8
Moderate	6	35.3	7	41.2
Severe	10	58.8	0	0
Very Severe	1	5.9	0	0
Total	17	100	17	100

Shows the measurement of pain and functional activity, pre-test distribution of severe categories around 10 people (58.8%), moderate categories around 6 people (35.3%) and very severe categories only 1 person (5.9%). The post-test distribution obtained a moderate

category of about 7 people (41.2%), and a mild category of about 10 people (58.8%), no respondents experienced severe or very severe pain, the distribution of measurements showed that there was a significant decrease in pain after being given core stability exercise in the form of wall squad and bridging with 8 repetitions, 2 times / week for 4 weeks (Table 2).

Table 3. Paired Sample T-Test

	Mean	N	Standar Deviasi	Sig (2-tailed)
Pre-Test	40.24	17	12.622	
Post-Test	73.06	17	7.709	0.00

The results of the paired sample T-Test test show a significant value (2 tailed) 0.000 ($p < 0.05$) these results indicate that doing core stability exercise 8 times has an impact on changes in pain and functional activity in OA knee conditions (Table 3).

Discussion

The results of statistical analysis, research conducted with 8 repetitions, 2 times / week for 4 weeks with a duration of 8 minutes showed that doing core stability exercise was able to reduce pain and increase functional activity in respondents with a diagnosis of OA knee which was characterized by a difference in the pre-test KOOS score (40.24) with a post-test score (73.06). The results of Wisnubrata & Zharfan's (2019) literature research also show that core stability exercise is very useful in reducing pain and improving physical abilities in patients with OA knee [15]. Research by Guliya et al (2021) also says that core stability exercise can optimize balance in the lower limbs [17].

A systematic review of randomized trials of therapeutic exercise in patients with OA knee showed that exercise can significantly reduce pain, improve physical function and quality of life [18]. Core stability exercise is an exercise that can improve coordination and stability in the trunk, pelvis, hip and knee muscles by stimulating the important muscles of the lumbopelvic-hip complex and the periarticular muscles of the knee [16][19]. Core stability exercise in the form of wall squats, aims to strengthen the lower extremity and improve posture, with the aim of reducing pain [20]. Bridging exercises consisting of hip bridges strengthen the quadriceps and hamstring muscles, resulting in biomechanical optimization that reduces joint stress levels.

Strong quadriceps muscles increase knee joint stability and minimize impact to the wider area. Core exercise can reduce stress on the knee joint thereby contributing to pain reduction [21][22]. This exercise also controls the femur in the knee joint which affects other bones in the joint so that they work synergistically [23]. The dosage in this study is supported by the journal Rausch Osthoff et al (2018) which recommends that exercise intensity of 8-12 repetitions increases muscle strength in adults and 10-15 repetitions is effective in increasing strength in older people [24].

Conclusion

Based on the research objectives and the results of the analysis regarding the effect of core stability exercise on changes in pain and functional activity in osteoarthritis knee joint conditions, the following conclusions can be drawn: There is an effect of giving core stability exercise on changes in pain and functional activity in osteoarthritis knee joint conditions for 8 exercises with a significant value of p -value = 0.000.

Author Contribution

All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Conflict of interest

Authors state no conflict of interest.

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