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THE EFFECT OF CLOSED KINETIC CHAIN EXERCISE ON PAIN SCALE AND RANGE OF JOINT MOVEMENT IN ELDERLY WITH OSTEOARTHRITIS IN WORK AREA PUSKESMAS SIMPANG IV SIPIN

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ABSTRACT

The cause of osteoarthritis is not clear, but there are risk factors that can increase osteoarthritis, one of which is age, which is a substantial factor in the occurrence of osteoarthritis. Pain in osteoarthritis interferes with the sufferer's activities and can also interfere with productivity. In addition, frequent joint pain will cause stiffness, which can cause limitations in joint motion. This study aims to determine the effect of closed kinetic chain exercise on the pain scale and joint range of motion in the elderly with osteoarthritis in the Simpang IV Sipin Health Centre, Jambi.

This type of research is quantitative using the Quasy Experiment research design. The sampling technique used was total sampling, with a complete sample of 46 respondents. The measuring tools used are an observation sheet and a goniometer.

The results of this study indicated that 26 elderly (56.5%) experienced moderate pain, and 20 elderly (43.5%) experienced severe pain. Respondents have a median degree of joint coverage of 72.50, a standard deviation of 37.968, the lowest degree of typical coverage is 200, and the highest is 115o. The Wilcoxon CKCE test results for the pain scale obtained Pvalue = 0.014; for joint range of motion, the Wilcoxon test results obtained Pvalue = 0.000. So it can be concluded from the Wilcoxon test results that closed kinetic exercise affects the pain scale and range of motion of the joints in the elderly with osteoarthritis in the Simpang IV Sipin Health Center work area.

Keywords: Osteoarthritis, CKCE, Pain, ROM

BACKGROUND

Osteoarthritis is a health disorder in which sufferers experience joint stiffness and inflammation, characterized by joint pain. Pain in this joint is caused by reduced special fluid, namely synovial, which acts as a joint lubricant and reduces pressure (Aulia, 2016). Osteoarthritis is also a chronic disease characterized by damage to the cartilage in the joints and causes the bones to rub against each other, which makes sufferers feel stiffness, pain, and a restricted range of motion. (World Health Organization, 2013).

Osteoarthritis often occurs in someone who is elderly and has experienced an aging process (Aulia, 2016). Aging processes, such as weakness around the joints, decreased joint flexibility, classification of joint cartilage, and reduced chondrocyte function, are considered supporters of osteoarthritis. (Akbar & Santoso, 2019). According to WHO 2018, Prevalence recorded musculoskeletal problems worldwide; osteoarthritis is in third place among other

musculoskeletal problems, namely 343 million sufferers (Musculoskeletal Conditions, 2021). According to Osteoarthritis Research International (OARSI), as many as 2.4% of osteoarthritis sufferers were recorded in YLD (Years Lived Disability) ranked 10th(Osteoarthritis: A Serious Disease, Submitted to the U . S. Food and Drug Administration, 2016).

According to the 2018 Basic Health Research (Rikesdas), joint disease is a painful disorder accompanied by stiffness, redness, and swelling not caused by a collision. Osteoarthritis is one of the three most common joint diseases in Indonesia. Riskesdas Prevalence regarding joint disease in Indonesia there were 14% of cases of arthritis diagnosed in 2007, there were 11.9% in 2013, and there were 7.3% in 2018. Meanwhile Jambi province was ranked 9th with 15.6% in 2007, ranked 23rd at 8.6% in 2013, and ranked 7th at 8.67% in 2018(Ministry of Health, 2018).

The cause of osteoarthritis is unclear, but there are risk factors that can increase osteoarthritis, one of which is age which is a decisive factor in the occurrence of osteoarthritis. (Djawas & Isna, 2020). The aging process is a cause of the decline in the joints (Akbar & Santoso, 2019). According to the Central Statistics Agency (BPS) 2021, the number of older adults in Indonesia is 29.3 million. It is projected that by 2045, the elderly population in Indonesia will make up nearly one-fifth of the total population in Indonesia. Therefore, the risk of osteoarthritis will increase because age is the most significant factor in the occurrence of osteoarthritis (Central Bureau of Statistics, 2021).

Pain in the joints is the main symptom of osteoarthritis sufferers and will be a common reason for a sufferer to seek medical help. In patients with osteoarthritis, there will be a reduction in synovial and calcification of joint tissue, narrowing the joint space and making the bones rub against one another, causing pain. Pain is usually felt when you have done much activity but will disappear when you rest (Wahyuningsih et al., 2020). Pain in osteoarthritis interferes with the sufferer's activities and can also cause productivity to be disrupted. Often the occurrence of pain in the joints will cause stiffness, which can cause limitations in joint motion (Matongka et al., 2021). In general, stiffness is felt for 15 minutes every morning when you wake up, and pain is felt in the joints due to changes in the joints caused by shaking or holding heavy loads (Wahyuningsih et al., 2020).

Muscle strength will be significantly reduced in OA patients, resulting in balance and gait disturbances, thereby reducing mobility (Adegoke et al., 2019). In addition, in patients with osteoarthritis who experience swelling in the bones and will slowly experience enlargement of the joints, which will result in progressive obstacles in moving the joints, usually, this swelling often occurs in the joints of the hands and knees (Putra et al., 2018).

Management in alleviating the symptoms of osteoarthritis, such as pain, stiffness, restriction of the limbs, and decreased function, can be done pharmacologically and non-pharmacologically. One of the nonpharmacological interventions that can be applied is physical exercise, namely closed kinetic chain exercise (Wahyuningsih et al., 2020). For example, the results of a study entitled Close Kinetic Chain Exercise Intervention Effectively Reducing Knee Pain in Genu Osteoarthritis at Gambiran Kediri Hospital showed a decrease in the pain scale on VAS values from high to low values after being given for two weeks; this was due to strengthening of the quadriceps which is associated with increased joint balance and increased muscle strength which can improve blood flow and nutrients to the cartilage (Wuryaningsih et al., 2022).

Closed Kinetic Chain Exercise (CKCE) is a muscle-strengthening exercise in osteoarthritis. This exercise is performed with relative strength while maintaining

position (Kuswardani et al., 2020). Closed Kinetic Chain Exercise is an active motion exercise on a fixed body, such as the soles of the feet touching the ground, which can involve coordination in several muscle groups and joints to improve joint balance, as well as activate the proprioception of the soles of the feet and this exercise movement is the same as a functional movement in daily activities –day (Djawas & Isna, 2020).

An initial survey conducted at the Simpang IV Sipin Health Center with an interview with a nurse at the Elderly Poly said that the management that has been given to the elderly with osteoarthritis is health education regarding the management of joint pain by using warm compresses, doing elderly exercises, and giving medicines to the elderly. Pain that is felt. However, this management is not yet adequate for patients with osteoarthritis. Based on initial data collection at the Simpang IV Sipin Health Center, it was found that the number of osteoarthritis patients in 2019 was 15%, in 2020, it was 18%, and in 2021 it was 29%. (Puskesmas Simp. IV Sipin, 2021). With prevalence data that always increases every year, researchers use physical exercises based on closed kinetic chain exercise an addition to managing patients with osteoarthritis.

RESEARCH METHODS

The type of research used is a quantitative research using a quasi-experimental design that explains the possibility of causation between the independent variables (closed kinetic chain exercise) and the dependent variable (pain scale and joint range of motion) without any manipulation of the variables that have the experimental group, namely patients osteoarthritis which will be given closed kinetic chain exercise and the control group, namely osteoarthritis sufferers without being given closed kinetic chain exercise. The type of design to be used is a non-equivalent control group design. The research sample was observed first before being given the intervention, then after being given the intervention, the sample was observed again (Rukminingsih et al., 2020).

The population in this study were all osteoarthritis sufferers in the Simpang IV Sipin Jambi Health Center Work Area in 2021, with as many as 46 people in total sampling. This research was conducted in the Simpang IV Sipin Health Center work area, which will be held on April 19-May 28, 2022. Univariate analysis was carried out on the variables from the research results to produce a frequency distribution of each variable studied, and bivariate analysis in this study was to analyze the effect of closed kinetic chain exercise by conducting statistical tests that are used, namely the Wilcoxon Sign Rank Test and the Mann Withney Test.

RESULTS

1. Univariate analysis

a) Gender

Table 1.1 Frequency Distribution of Respondents Based on Gender in the Working Area of Simpang IV Sipin Health Center

Gender	Frequency	Percentage (%)
Woman	39	84.8
Man	7	15,2
Amount	46	100

Based on Table 1.1, it was found that of the 46 respondents suffering from osteoarthritis, 39 were female (84.8%) elderly and 7 were male (15.2%).

b) Age

The frequency distribution of osteoarthritis sufferers by age in the Simpang IV Sipin Health Center work area can be seen in table 1.2 as follows:

Table 1.2 Frequency distribution of respondents based on age in the Simpang IV Sipin Health Center work area

Age	Frequency	Percentage (%)
55-60	20	43.5
61-65	16	34,8
>65	10	21,7
Amount	46	100

Based on Table 4.2, it can be seen that the most respondents aged 55-60 years were 20 people (43.5%) who suffered from osteoarthritis while those aged >65 years had at least 10 people (21.7%) suffering from osteoarthritis.

c) Pain Scale

The frequency distribution of the pain scale of osteoarthritis sufferers before being given a closed kinetic chain exercise in the Simpang IV Sipin Health Center work area can be seen in table 1.3 as follows:

Table 1.3 Frequency Distribution of Pain Scale Before Intervention is Performed on Respondents in the Working Area of the Simpang IV Sipin Health Center

Pain Scale	Frequency	Percentage (%)
Moderate Pain	26	56.5
Severe Pain	20	43.5
Amount	46	100

Based on Table 4.3, it can be seen that 26 elderly (56.5%) experienced moderate pain and 20 elderly (43.5%) experienced severe pain.

The frequency distribution of the pain scale of osteoarthritis sufferers after being given closed kinetic chain exercise in the Simpang IV Sipin Health Center work area can be seen in table 1.4 as follows:

Table 1.4 Frequency Distribution of Pain Scale After Intervention on Respondents in the Working Area of Simpang IV Sipin Health Center

Pain Scale	Frequency	Percentage (%)
Mild Pain	19	41,3
Moderate Pain	27	58,7
Amount	46	100

Based on Table 4.4, it can be seen that the pain scale of the respondents after being given closed kinetic chain exercise had mild pain as many as 19 elderly (41.3%) and moderate pain as many as 27 elderly (58.7%).

d) Range of Motion of the Joints

The frequency distribution of the range of motion of joints with osteoarthritis based on the working area of the Simpang IV Sipin Health Center can be seen in table 1.5 as follows:

Table 1.5 Frequency Distribution of Joint Range of Motion Before Intervention Is Given to Respondents in the Working Area of the Simpang IV Sipin Health Center

Var.	Median	Std Dev	Std Error	Min-Max
ROMS	72.50	37,97	2,799	20-115

Based on table 4.5 it can be explained that the average respondent has a degree of joint coverage with a median of 72.50, a standard deviation of 37.968, the lowest degree of joint coverage is 20^{o} and the highest is 115^{o}.

The frequency distribution of the range of motion of joints with osteoarthritis after being given closed kinetic chain exercise in the Simpang IV Sipin Health Center work area can be seen in table 1.6 as follows:

Table 1.6 Frequency Distribution of Joint Range of Motion After Intervention Given to Respondents in the Working Area of Simpang IV Sipin Health Center

Var	Med	Std Dev	Std Error	Min-Max
ROMS	80	39,900	2,941	25-125

Based on table 4.6 it can be explained that the respondents after being given closed kinetic chain exercise have a degree of joint scope with a median of 80, a standard deviation of 39,900, the lowest degree of joint scope is 25o and the highest is 125o

2. Bivariate Analysis

a. The Effect of Closed Kinetic Chain Exercise on Pain Scale in Elderly with Osteoarthritis in the Working Area of Simpang IV Sipin Health Center

The effect of CKCE on the pain scale in the elderly can be seen in the Wilcoxon test in table 2.1 as follows:

Table 2.1 The Effect of Closed Kinetic Chain Exercise on Pain Scale in Elderly with Osteoarthritis in the Working Area of Simpang IV Sipin Health Center

Measurement	N	Asymp Sig (2-tailed)	
		Week 1	Sunday 2
Pre-Test Post-Test Experiment	23	0.046	0.000
Pre-Test Post-Test Control	23	1,000	0.014

Based on table 2.1 the results of the analysis of the effect of closed kinetic chain on the pain scale in the elderly with osteoarthritis using the Wilcoxon test at 2 weeks of treatment were known from the 23 control groups in the first week a Pvalue of 1,000 was obtained and in the second week a Pvalue of 0.014 was obtained, while in the 23 experimental groups in the first week a Pvalue was obtained Pvalue 0.046 and in the second week a Pvalue of 0.000 is obtained. From the results of the Wilcoxon test, if a Pvalue <0.05 is obtained, it can be concluded that there is an effect of closed kinetic exercise on the pain scale in the elderly with osteoarthritis.

b. The Effect of Closed Kinetic Chain Exercise on Pain Scale in the Elderly in the Simpang IV Sipin Health Center Work Area

The difference in the effect of CKCE between the intervention and control groups on the pain scale in the elderly can be seen in the MannWithney test in table 2.2 as follows

Table 2.2 The Effect of Closed Kinetic Chain Exercise on Pain Scale in Elderly with Osteoarthritis in the Working Area of Simpang IV Sipin Health Center

Variable	N	Asymp. Sig (2-tailed)	Mann-Withney U
Pain Scale	46	0.000	178

Based on table 2.2, it can be seen from the Mann Withney test, it can be seen that the U value is 178 with a significant level of 0.42 (P <0.05). So there are differences in pain scales in the two groups and there is an effect of lost kinetic chain exercise on the two groups that were given the intervention and were not given the intervention.

c. The Effect of Closed Kinetic Chain Exercise on the Range of Joint Motion in the Elderly in the Working Area of Simpang IV Sipin Health Center

The effect of closed kinetic

chain exercise on the range of motion of joints in the elderly can be seen in table 2.3 below

Table 2.3 The Effect of Closed Kinetic Chain Exercise on the Range of Joint Motion in the Elderly in the Working Area of Simpang IV Sipin Health Center

ROMS	asymp. Sig (2-tailed)	
	Week 1	Week 2
Intervention Pre-Test Post-Test	0.000	0.000
Pre-Test Post-Test Control	1,000	0.091

Based on table 2.3 above, it can be seen that in the measurements in the first week, it was found that the pre-test and post-test assessments for the intervention group obtained a P-value of 0.000 and in the control group a P-value of 1.000. Whereas in the second week the intervention group obtained a Pvalue of 0.000 and the control group obtained a Pvalue of 0.091. From the results of the Wilcoxon test, if a P-Value <0.05 is obtained, it can be concluded that there is an effect of closed kinetic exercise on the range of motion of joints in the elderly with osteoarthritis.

d. **Comparison of the effect of Closed Kinetic Chain Exercise on the Range of Joint Motion in the Elderly in the Working Area of Simpang IV Sipin Health Center**

The effect of closed kinetic chain exercise on the range of motion of joints in the elderly can be seen in table 2.4

Table 2.4 The Effect of Closed Kinetic Chain Exercise on the Range of Joint Motion in the Elderly in the Working Area of Simpang IV Sipin Health Center

Variable	asymp. Sig (2-tailed)	Z
Range of Motion of the Joints	0.000	-5,341

Based on table 2.4, it can be seen by the Mann Withney test that in a comparison of the two intervention and control groups it is found that the Pvalue is 0.000. So it can be concluded that in each joint range of motion there is a difference between the group that was given the intervention and the group that was not given the intervention and there is an effect of closed kinetic chain exercise on the range of motion of the joints in the elderly with osteoarthritis.

DISCUSSION

The measurement results in the intervention group's week obtained a P = 0.000. Whereas in the second week, the intervention group obtained a sig value of 0.000, meaning that closed kinetic exercise affects the joint range of motion in the elderly with osteoarthritis.

This intervention was carried out in 2 groups: the intervention group and the control group. Thus, the researchers used a statistical test, namely the Mann-Withney test, to find the differences between the two groups. The results obtained were P = 0.000. Then H-0rejected and Ha accepted, so there is a difference between the intervention and control groups.

According to Hasim (2019), this exercise can stimulate mechanical receptors and muscle joints and support the activation of agonist and antagonist muscles which affect dynamic balance.

The benefits of CKCE are that it can provide a significant proprioceptive and kinesthetic stimulus through the resulting joint approximation, better stabilizing the joint against the resulting movement.(Wuryaningsih et al., 2022).

This study is in line with Adegoke (2019) that the passive range of motion for CKCE administration increased from the beginning to the end of the eighth week (114.71 ± 13.50; 120.64 ± 11.32). Closed Kinetic Chain exercise activates antagonistic muscle groups against several collaborative groups (Greenstein, 2011). The Closed Kinetic Chain exercise program can improve balance and walk by increasing rotational force, traction strength, and joint stability (Park, 2017). The closed kinetic chain movement technique is a movement exercise following the anatomy of the knee joint, namely flexion-extension motion, and motion that is intended as a range of motion movement of the joint (Susilawati, 2015).

This study was also followed by the results of previous studies, which were in line with the measurement results that there was an increase in LGS in both knees as measured using a goniometer in evaluation one and evaluation 2 AROM knee flexion right and left 120o to 125o in evaluation three and evaluation 4(Djawas & Isna, 2020). There is a change in the range of motion of the joints because this CKC exercise has the advantage that the exercise resembles daily activities and functional activities such as walking(Adegoke etal., 2019)

CONCLUSION.

From the results of research on the effect of closed kinetic chain exercise on pain scale and joint range of motion in the elderly with osteoarthritis

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