



## The Effect of Range of Motion Exercise to Improve Muscle Strength on Physical Mobility Barriers in Osteoarthritis Patient

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### ABSTRACT

**Objective:** To determine the effect of ROM activity therapy to increase muscle strength on physical mobility barriers in osteoarthritis cases.

**Methods:** This case study uses descriptive methods to describe assessment, data analysis, nursing plans, interventions, implementation, evaluation by describing cases and using a nursing process approach so that it focuses on one of the important problems of osteoarthritis. Assessment is done by history taking and observation. Nursing diagnoses are determined by NANDA, while nursing plans are adjusted to interventions in the Nursing Intervention Classification (NIC), implementation is carried out according to nursing care plans that have been prepared, and nursing evaluations are documented using the SOAP model.

**Results:** The results of the evaluation were carried out within a period of 3 days, the intervention given with range of motion activity therapy had an effect in increasing lower extremity muscle strength. The patient cannot move freely and has difficulty carrying out activities, for that the authors design an intervention especially to increase muscle strength and after implementation the patient can perform optimal movements.

**Conclusion:** It was concluded that the effect of ROM activity therapy to increase muscle strength on physical mobility barriers in cases of osteoarthritis. It can be seen from the results of the research evaluation that range of motion exercises before and after can have a major influence in increasing muscle strength.

**Keywords:** muscle strength, osteoarthritis, range of motion

## Introduction

Osteoarthritis is a chronic and progressive disease that has an impact on sufferers, resulting in difficulty walking, bending, or standing, even to the point of not being able to carry out their daily activities (Zurayahya et al., 2020). WHO data in 2014 stated that the world population experienced osteoarthritis as many as 335 million people throughout the world and Risesdas data in 2013 reported the prevalence for osteoarthritis sufferers in Indonesia as much as 24.7% of the total population in Indonesia, when viewed from the characteristics of age, the highest data is at age 75 years. There are more osteoarthritis sufferers in women as much as 27.5% compared to men 21.8% (Ihsan, 2015).

Osteoarthritis is a long-term chronic disease characterized by abnormalities in cartilage or what is known as joint cartilage and bone. Cartilage is the part of the joint that covers the ends of the bones, to facilitate movement of the joint. Disorders caused by cartilage, namely bones will rub against each other, symptoms of stiffness arise, pain and limitations in movement arise (Priestnall *et al.*, 2020). Osteoarthritis often occurs in old age or over 60 years, this is because of the risks that can occur or are found in the elderly such as obesity, rarely exercising so that the muscles of the body experience a process of decline and stiffness, injuries from falls, and gender. Osteoarthritis can affect all joints in the body but the most common complaints in the elderly are usually in the shoulders, back, hips, and knees. Of all the joints that are prone to be experienced by the elderly, namely the joints in the knees (Yuswatiningsih, 2018).

Osteoarthritis symptoms that appear are usually excessive pain, will get worse when moved. The occurrence of difficulty or stiffness in the joints that will affect the movement of the capsules, ligaments, muscles and surfaces of the joints. Limited range of joint motion, crepitus sound that arises from friction in the main structural tissues of the joints, the main triggers are friction between bones and muscles, muscle weakness, deformities, abnormalities in the shape and size of the bones after trauma that occur due to joint dislocation (Purwanto, 2018).

Osteoarthritis patients will experience physical mobility barriers, namely the inability to perform range of motion by themselves. This limitation can be identified in a client whose one extremity has limited movement or is even immobilized. People who experience physical mobility barriers will have difficulty when moving due to disturbances in muscle strength, balance, and movement coordination, making it difficult to carry out daily activities (Siswanto, Mahfudhoh, & Susanti, 2018).

This exercise is done to maintain or increase the ability to move joints perfectly, both normally and completely to increase muscle strength (Andriani et al., 2022; Hanan, 2016). ROM it self is a joint movement exercise where the patient will move each joint according to its normal movement both passively and actively. Passive ROM is given to patients with weakness in the arm muscles and leg muscles. Exercises are given to the bones and joints because the patient cannot do it alone, which of course will require the help of nurses and their families (Kusumawaty & Nurapandi, 2022). Active ROM is an exercise that is done alone without the need for help from nurses or family. Exercises performed on joints and muscle weakness. The exercises are: Wrist flexion and extension, elbow flexion and extension, forearm pronation and supination, shoulder pronation, abduction and adduction, shoulder rotation, toes flexion and extension, leg inference and ankle flexion and extension. The purpose of ROM itself is to maintain or maintain muscle strength, maintain joint mobility, stimulate blood circulation, prevent deformities (Wardojo *et al.*, 2021).

## **Objective**

This study aims to determine the effect of ROM Activity Therapy to Increase Muscle Strength on Physical Mobility Barriers in Osteoarthritis Cases.

## **Method**

The type of method used in this research is descriptive with data collection methods through interviews and direct observation to the elderly in the village of Talagening, Bobotsari sub-district, Purbalingga district. During the research process which lasted for three days on 26, 28, and 29 April using a review of nursing documents as a source of patient medical records. For this interview method, the author will conduct interviews directly with patients regarding the complaints felt by the patient, the authors will also ask about the current medical history about when the complaints experienced by the patient appeared, what actions have been taken (Dalle, 2017). Then interviews were conducted with the patient's family regarding since when did the client experience this disease, when did this disease start, did you check with the doctor, what were the results, were there any complaints that you felt when doing daily activities during activities.

Researchers conducted physical examination observations by direct observation of the general condition, sensory perception system, head to toe examination, respiratory system, cardiovascular system, central nervous system, gastrointestinal system, musculoskeletal system, integumentary system, reproductive system, genitourinary system. The examination focuses on the physical musculoskeletal system on bone disorders, gait disorders, joint stiffness and joint bruising (Dalle, 2017). The author uses various sources of medical records to discuss nursing care for physical mobility barriers with joint problems in the elderly (Dalle, 2017). The collection of data obtained from the results of the client's medical records that had previously been examined by doctors and by the author was documented in the form of nursing care.

The ethics of this case study pays attention to ethical principles and research issues, namely informed consent, Anonymity (without name), Confidentiality, Justice, Honesty (veracity), the principle of benefit, Risk (benefits ratio), The principle of respecting rights human rights (respect human dignity) (Pangaribuan, 2017).

## **Results**

### ***Case Presentation***

The nursing care provided to Mrs. T has been carried out for 3 consecutive days from April 26, April 28, and April 29, 2022 starting from assessment, intervention, implementation, and evaluation. The first stage of the study: based on the results obtained, the author conducted a study on Mrs. T by using the interview, observation and physical examination or head to toe method, subjective data found that patients had difficulty in being active and complained that they often felt throbbing pains in the knee joints and ankles and could not bend and there would be pain because they used to do it when they were young. strenuous work and often goes a long way. Objective data obtained symptoms felt by Mrs. T tingling to cramps in the knee area, in the knee and soles of the feet often experience pain until the skin area becomes blue or bruised. Complaints of pain are felt gradually obtained Provocative: Due to carrying weight, Quality: Feels pricked - punctured, Region: Knee section, Scale: Pain scale 4, Timing: Disappearing. The trigger factors for clients often experience this, the first is because the client's BMI obesity factor is found to be 71:  $(1.62 \times 1.62) = 27.05$  which is considered excessive, the second is when the patient eats

offal, eats nuts, and salted fish and the temperature is too high. Cold or bathing in cold water will cause pain.

Table 1. Comparison of assessment results in patients Osteoarthritis with signs and symptoms in theory

| Theory              | Case  |
|---------------------|---|
| Joint Pain          | Client complains of pain  |
| Stiffness           | Clients say they often experience stiffness in the knee joint and difficult to move |
| Loss of flexibility | The client says the loss of the ability to move and move in the joints.             |

**Nursing Diagnosis** The author determines nursing diagnoses using the North American Nursing Diagnosis Association (NANDA) and based on the data obtained from the assessment results it can be concluded that the nursing diagnosis for Ny. T is the physical mobility barrier (00085:217).

**Nursing Intervention** The author prepares a nursing plan using the *Nursing Outcome Classification* (NOC) with an appropriate nursing plan to overcome barriers to physical mobility for the purpose and outcome criteria, namely after nursing actions for three times 24 hours it is expected that the client's physical mobility will increase. The author chose the outcome of ambulation (0200) because it increases mobility both walking and moving from one place to another and increasing the client's muscle strength after the intervention for 3 days from 2 to 5.

The intervention that the author arranged using the Nursing Intervention Classification (NIC) with intervention namely ambulation exercise therapy (0221:438) includes monitoring the client's use of crutches or other walking aids, helping the client to sit on the side of the bed to facilitate posture adjustment, helping the client to move as needed, provide assistive devices (cane, walker, or wheelchair) for ambulation, if client is unstable, assist client with initial ambulation, assist client to stand and ambulate a certain distance, encourage client to rise as much and as often as desired.

**Nursing Implementation** The author carried out nursing implementation actions for 3 days with nursing diagnoses of physical mobility barriers in accordance with the theory, namely explaining to clients and families the benefits and goals of doing joint exercises aimed at helping increase muscle strength, reducing the risk of disease getting worse and so that joints are not stiff and can move freely.

The implementation of the first day teaches and monitors the use of client crutches or other walking aids aimed at facilitating mobility and ambulation of movements from one place to another. Assisting the client to sit on the side of the bed facilitates posture adjustment and helps speed up the client's recovery. Conduct a comprehensive pain assessment which includes location, characteristics, onset/duration, frequency, quality, intensity or severity of pain and triggering factors. persist, as well as the frequency and quality of the pain caused. Observing the presence of nonverbal clues about discomfort, usually the client will be asked to indicate the location of the part that often experiences pain during activities. Help clients move as needed to help meet their needs. Apply or provide assistive devices (cane, walker, or wheelchair) for ambulation if the client is unstable during physical mobility in order to reduce the client's risk of falling during mobilization exercises and to prevent risks that should not occur. Teach and assist clients with early ambulation to help clients perform walking exercises or move places seeking to

maintain independence as early as possible by guiding patients to maintain physiological function so that they can move freely.

The implementation on the second day is doing active ROM exercises on the client with assistance according to indications. Based on the results of research on the effectiveness of ROM exercises on increasing joint strength in clients suffering from osteoarthritis. Wilcoxon statistical analysis test results show that ROM exercises have an effect on reducing joint stiffness scales in osteoarthritis patients. The results of this analysis show that ROM exercises can be applied to interventions in treating osteoarthritis patients. This is also explained from the results of research from the Indonesian Rheumatology Association or IRA for the management of osteoarthritis, namely non-pharmacological therapy, one of which is physical therapy such as exercises to improve the scope of joint movement, muscle strength (quadriceps/groin) and joint movement aids. The study found that there was an effect of ROM exercise on joint flexibility in the elderly. ROM is able to (1) maintain muscle ability, (2) maintain joint movement, (3) improve blood circulation, (4) avoid disability. ROM exercises increase blood flow to the joint capsule and increase joint flexibility so that joint stiffness and pain can be reduced and even resolved.

Implementation on the third day supports active ROM exercises with assistance according to indications aimed at education the client and family to repeat every exercise that has been recommended and maintain the stability of the client's exercise so that the client's posture condition can return to normal. It can be concluded that ROM exercises are able to affect changes in osteoarthritis joint stiffness while maintaining joint range of motion so that there is an improvement in the problematic joint area.

Nursing Evaluation On 26, 28, and 29 April 2022 an evaluation for nursing problems with physical mobility barriers in giving active ROM exercises still needs to be done with more frequency and subjective data obtained by clients saying they can do what was taught yesterday by themselves and are very helpful once and know what can be done to improve movement in joint stiffness, objective data is that the client seems to have made good progress in being able to carry out the ROM technique taught yesterday by doing it independently and sometimes still being assisted by his family.

## Discussion

Based on the findings of several previous researchers regarding the effect of ROM activity therapy on increasing muscle strength on physical mobility barriers in cases of osteoarthritis, it was found that the comparison of the results of the study in osteoarthritis patients with the theoretical signs and symptoms in the table above.

In the case of Mrs. T complains of pain, this is in accordance with the theory put forward by Zuraiyahya et al regarding the acute symptoms of Osteoarthritis, namely experiencing joint pain. It occurs when cartilage, which is the protective cushion of bone, loses its elasticity. As a result, friction occurs between the bones which makes them more susceptible to damage and causes inflammation of the joints resulting in pain (Zuraiyahya *et al.*, 2020)

In the case of Mrs. T said he often experiences stiffness in the knee joint and is difficult to move, this is in accordance with the theory written by Arovah regarding the symptoms of osteoarthritis, namely stiffness occurs because high uric acid can form needle-like crystals in the joints. This then causes a sensation of pain, redness, swelling, and stiffness in the affected joint. Basically, the body produces uric acid when it breaks down purines, which are substances that are also found naturally in the body (Arovah, 2015).

In the case of Mrs. T said the loss of the ability to move and move in the joints was in accordance with the theory regarding the symptoms of osteoarthritis, namely the loss of flexibility due to internal and external factors, for internal factors the joints occurred due to age, anatomy, and weight factors. External factors occur due to the influence of environmental temperature as a result of a decrease in the body's ability so that there is a change in muscle function where there is a decrease in muscle elasticity and flexibility, the onset of pain in osteoarthritis in the knee area is caused by damage to joint cartilage, this condition occurs when the cartilage that cushions The bone protector loses its elasticity which results in friction between the bones which causes joint pain (Zurayahya *et al.*, 2020)

Based on the results of the study and analysis of the data that the author got from the client and the family of Mrs. T, the author can formulate a nursing diagnosis of physical mobility barriers related to joint stiffness. Osteoarthritis in clients is caused by age, obesity, lack of exercise as well as environmental factors and an unhealthy lifestyle that can lead to joint stiffness and decreased range of motion. Nursing diagnosis on Mrs. T in this study is in line with the Gerontic Nursing Care of Mr. W with the problem of Physical Mobility Barriers, the main problem of Osteoarthritis is that it is found that Mr. W complains of frequent leg pain when moving or walking far, right knee pain, kemeng-kemeng, if you can't bend it, stiff and very painful.

## Conclusion

After the author conducted an assessment, determination of diagnosis, planning, implementation, and evaluation of nursing during nursing care for Ny. T with osteoarthritis which was carried out for 3 days starting from 26, 28, 29 April 2022. The author found that the priority of problems with physical mobility barriers related to joint stiffness in Ny. T. Nursing Intervention The author prepares a nursing plan using the *Nursing Outcome Classification* (NOC) and *Nursing Intervention Classification* (NIC) with an appropriate nursing plan to overcome barriers to physical mobility with the goal and outcome criteria, namely after nursing actions for three times 24 hours, mobility is expected client's physique increases. The author can conclude that ROM exercises are able to affect changes in osteoarthritis joint stiffness while maintaining joint range of motion so that there is an improvement in the problematic joint area.

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