

# Physiotherapy Management In Bilateral Knee Osteoarthritis By Providing Manual Therapy And Exercise Therapy: Case Report

<sup>1</sup>Fenisa Nurul Hidayah, <sup>2</sup>Adnan Faris Naufal, <sup>3</sup>Anas Pradana

<sup>1</sup>Physiotherapy Professional Study Program, Faculty of Health Sciences, Muhammadiyah University of Surakarta

<sup>2</sup>Physiotherapy Study Program, Faculty of Health Sciences, Muhammadiyah University of Surakarta

<sup>3</sup>PKU Muhammadiyah Bantul, DIY Yogyakarta, Indonesia

Email : [j130225033@student.ums.ac.id](mailto:j130225033@student.ums.ac.id)

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## ABSTRACT

Osteoarthritis of the knee is a degenerative disease that occurs in the joints and is progressive in nature which is characterized by damage to the cartilage structure which causes pathological changes in the joints. Symptoms that often arise are stiffness in the morning and there is also a "cracking" sound or also called a crepitus sound when making movements on the knee. Knee pain has an impact on various aspects of quality of life because it affects a decrease in functional activities such as squatting, standing, walking long distances, and going up and down stairs. The prevalence of Knee Osteoarthritis affects approximately 25% of adults and is currently increasing by 65% over the last 20 years. In this study, the researchers intervened in the form of manual therapy, Mulligan Mobilization With Movement (MWM) and patella mobilization, and exercise therapy in the form of stretching the lower extremities, relaxing contracts, quadriceps sets, active exercises and bridging exercises. The aim of this intervention was to reduce pain and increase functional activity in patients with Knee Osteoarthritis. The results of this study found a decrease in the level of pain intensity and a decrease in the score of the disorder experienced by the patient.

**Keywords:** *Knee Osteoarthritis, Osteoarthritis Exercise Therapy, Manual Therapy, Mulligan Mobilization With Movement, Patella Mobilization, WOMAC Index.*

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## INTRODUCTION

*Osteoarthritis* Knee is a degenerative disease that occurs in the joints and is progressive. It is characterized by damage to the cartilage structure which causes pathological changes in the joints (Sengul et al., 2022). Knee osteoarthritis is the 10th leading cause of physical disability in the world.

The prevalence of knee osteoarthritis affects approximately 25% of adults and has increased by 65% over the last 20 years. (Bunt & Carolina, 2018). The prevalence of OA knee contributes to pain and functional disability around 19.2-27.8% of adults aged > 45 years and about 37% of people aged ≥60 years have knee complaints. OA prevalence data in Arab countries found that out of 300 patients, 53.3% of men and 60.9% of

women showed radiographic features of knee OA and 80% of these patients reported knee pain. The risks that most often arise are old age (degenerative), obesity and decreased muscle strength (Sengul et al., 2022)

Symptoms that often arise are stiffness in the morning and there is also a "cracking" sound or also called a crepitus sound when making movements on the knee. Knee pain has an impact on various aspects of quality of life because it affects the decrease in functional activity (Vincent et al., n.d.). Patients with Knee Osteoarthritis (OA) if they don't get treatment immediately can have an impact on decreasing functional life activities such as walking, squatting, bathing, and doing other housework

because of pain in the knee joint(Lai et al., 2021). Pain in the knee joint arises progressively or slowly, then the pain arises during activity and goes away when you rest. One of the other impacts of Knee Osteoarthritis is the occurrence of balance disorders in the elderly due to a decrease in flexibility and muscle strength(Manuaba et al., 2021).

Physiotherapy treatment in cases of osteoarthritis is very important to control pain while increasing function and functional ability(Alkhamuka & Alshami, 2019). In this study, the researchers chose interventions, namely manual therapy in the form of Mulligan Mobilization With Movement (MWM) and patella mobilization and exercise therapy in the form of lower extremity stretching, contract relax, quadriceps set, active exercise and bridging exercise.Alkhamuka & Alshami (2019) said that the goals of manual therapy and exercise therapy were to reduce pain, increase range of motion (ROM) and improve physical function in patients with osteoarthritis.

## RESEARCH METHODS

This research was conducted at PKU Muhammadiyah Bantul on March 2 - March 14, 2023. The research was conducted on the respondent Ny. S who is 80 years old with a medical diagnosis of Bilateral Knee Osteoarthritis as evidenced by X-Ray examination. The patient came with complaints of pain and stiffness in both knees. These complaints cause the patient to experience difficulties in carrying out daily activities. The main activities that are disrupted are when making movements from sitting to standing, walking long distances and prayer movements. In addition, the patient also complained that there was a "cracking" or crepitus sound in both knees when doing knee movements. The patient has good enough cognitive skills so that he is able to understand the instructions given by the therapist properly.

The patient has had 4 meetings of physiotherapy, with physiotherapy interventions in the form of manual therapy (Muligan Mobilization With Movement (MWM) and patella mobilization) and exercise therapy (stretching lower extremity, contract relax,

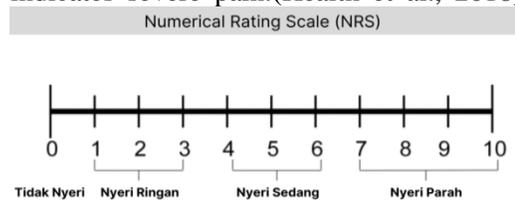
quadriceps set, active exercise and bridging exercise). Outcomes in this study used (Numeric Rating Scale) to measure the level of pain experienced by patients, Goniometer to measure Knee Range of Motion (ROM), Western Ontario and McMaster University (WOMAC) to measure functional ability in the knee. The above interventions are given with the aim of reducing pain, increasing the range of motion of the knee, restoring normal movement and increasing the patient's functional ability.

**This research instrument is as follows:**

### 1. Painful

Knee pain is a condition where a person feels a painful sensation in the knee when doing activities, standing, walking, or while still. If a person feels pain in the knee when doing activities or walking, this can be due to the excessive pressure experienced by the knee. This pain can originate from any of the bony structures of the knee such as the knee joint, kneecap, or the ligaments and cartilage(Lonica et al., 2021).

Measurement of pain can be measured using the NRS (Numeric Rating Scale) by asking the patient the pain they feel, namely pain when standing still, moving and pain when pressed. In measuring pain with the NRS, patients are asked to rate the pain they are experiencing using numbers 0-10. A score of 0 indicates no pain, 1-3 indicates mild pain, 4-6 moderate pain and 7-10 indicates severe pain.(Health et al., 2018).



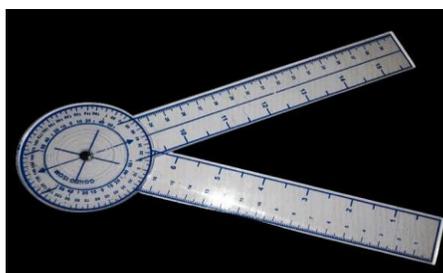
**Picture 1.** Pain Scale Numeric Rating Scale

### 2. Tightness

*Tightness* is a condition in which muscles shorten due to decreased physiological and pathological properties of the muscles such as trauma, infection or due to inactivity, thereby inhibiting range of motion and muscle performance. Tightness can be checked by palpation.

### 3. Scope of Motion of the Joints

The scope of joint motion is the ability to move the joints of the body to be able to carry out daily activities. When a joint moves within a certain range, all structures around the joint will be affected including muscles, joint surfaces, joint capsules, ligaments, fascia, blood vessels and nerves. The range of motion of the joint is divided into active and passive range of motion. The range of motion of the joints can be measured using a goniometer. According to the International of Standard Orthopedic Measurement (ISOM) the normal value of LGS knee dextra and left is  $S = 0^\circ - 0^\circ - 125^\circ$ .



Picture 2. Goniometer Measuring Instrument

### 4. Muscle Strength

Patients with knee osteoarthritis often experience a decrease in muscle strength due to inactivity in carrying out an activity due to pain, which causes a decrease in muscle strength. Strength assessment can be measured using the Manual Muscle Test (MMT). The purpose of using Manual Muscle Testing is to help make a diagnosis, determine the type of therapy, and determine the prognosis. The assessment of muscle strength chosen by the author is according to Nancy Berryman Reese, et al. Criteria for assessing muscle strength:

0 = no muscle contraction

1 = muscle contractions palpable but no movement

2- = subject moves with incomplete LGS, without fighting gravity

2 = subject moves at full LGS, without fighting gravity

2+ = subject is moving and only able to defy half gravity with LGS less than middle range

3- = subject moving against gravity although unstable with LGS more than middle range

3 = subject moving at full LGS, against gravity

3+ = subject moving with almost full LGS, against gravity, against minimum resistance

4 = subject moves with full LGS, against gravity, against moderate resistance

5 = subject moves at full LGS, against gravity, against maximum resistance

### 5. Functional Activity

Functional activity is the ability of the patient to carry out daily activities, due to pain in the knee area so that the patient experiences activity limitations. Impaired physical activity occurs due to reduced joint stability and weakness of the quadriceps muscles due to muscle atrophy and atrogenic muscle inhibition. This is due to reduced physical activity resulting in atrophy (Lonica et al., 2021). In this study, researchers used the WOMAC index to measure the level of functional ability of patients by asking patients questions about limitations in functional activities such as squatting, standing, walking, going up and down stairs, toileting, etc.

### Data collection techniques

#### Specific check

Physical examination is carried out with the aim of knowing the patient's condition. Specific examinations include vital signs, palpation, basic motion checks, and specific tests. Specific tests on the knee include:

#### Ballotment test

The ballotment test is an examination used to determine the presence of fluid in the knee. The trick is to rub the patellar process by pressing with one hand, besides that with the fingers of the other hand the patella is pressed down, but if the patella cannot be pressed down,

then there is a buildup of fluid which makes the patella rise (Maricar et al, 2017).



**Picture 3.** Ballotement Test

The image above is a test performed by a therapist on a patient

**Creptitation test**

The crepitus test is an examination that is used to determine if there is a “crackling” or crepitus sound in broken bones originating from bubbles popping due to pressure in the joint. This test is carried out by pressing the patellofemoral joint alternately on the superior and inferior poles gently. Then move also to the medial and lateral poles. The interpretation of this examination is that it hurts if the middle part of the articular cartilage is damaged (Lawry, 2016).

**RESULTS**

**Evaluation of the degree of pain using the Numeric Rating Scale (NRS)**

Evaluation of pain using the Numeric Rating Scale (NRS) from the first therapy meeting to the fourth therapy meeting

**Table 1** Evaluation of Pain Using a Numeric Rating Scale

Pain type	T1	T2	T3	T4
Static pain	2	2	1	0
Motion pain	8	7	7	5
Tenderness	6	6	5	3

Based on the table above, from T1 to T4 respondents experienced a decrease in the degree of pain, namely silent pain at T1 with a value of 2 which means mild pain and T4 with a value of 0 which means no pain. Movement pain on T1 has a value of 8 which means severe pain and T4 has a value of 5 which means moderate pain.

Meanwhile, T1 has a value of 6 which means moderate pain and T4 has a value of 3 which means mild pain.

**Assess the range of motion of the joint using a goniometer**

**Table 2.** Evaluation of the Scope of Motion of the Joints using a Goniometer

	ROM Dextra	Left ROM	Normal ISOM
T1	S=10°-10°-70°	S=5°-10°-75°	S=0°-0°-125
T2	S=10°-10°-70°	S=5°-5°-75°	S=0°-0°-125
T3	S=5°-5°-85°	S=5°-5°-90°	S=0°-0°-125
T4	S=0°-0°-90°	S=0°-0°-100°	S=0°-0°-125

Based on the table above, the results show that from T1 to T4 there is an increase in the range of motion of the knee joint in the flexion movement of the knee dextra 90° and 100° left knee flexion°. Meanwhile, the extension movement also experienced an increase, namely the extension of the knee dextra 0° which means the respondent can full ROM.

**Evaluation of muscle strength using the Manual Muscle Test (MMT)**

**Table 3.** Evaluation of Muscle Strength using the Manual Muscle Test (MMT)

	Dextra MMT value	Left MMT value
T1	3+	3+
T2	3+	3+
T3	4	4
T4	4	4

Based on the table above, there is an increase in muscle strength in the right and left knee from T1 to T5, from 3+ to 4.

**Evaluate functional capabilities with the WOMAC indexes**

**Table 4.** Evaluation of Functional Capability Using WOMAC

	WOMAC interpretation results
T1	48
T2	40
T3	35
T4	28

Based on the table above, the results show that there is an increase in functional ability in respondents at T1 to T5 as measured using the WOMAC index.

## DISCUSSION

Respondents after being given intervention 4 times with manual therapy (Mulligan Mobilization With Movement (MWM) and patella mobilization) and exercise therapy (stretching lower extremity, contract relax, quadriceps set, active exercise and bridging exercise) can have an impact on complaints that perceived by respondents.

*Mulligan Mobilization With Movement (MWM) Knee Flexion-Extension* aims to increase the Range of Motion Knee. This exercise is performed with the respondent sleeping on his back (supine lying), then the physiotherapist holds the tuberosity of the tibia then translates it posteriorly and in combination with being given encouragement to internal rotation when flexing the knee. After that, the next movement is the opposite of the previous movement, namely the physiotherapist holds the tibial tuberosity, then translates it anteriorly, the combination is moved to knee extension.(Can, 2019).

Patella mobilization aims to potentially reduce pain levels and improve function and quality of life in patients with knee osteoarthritis(Sit et al., 2018). This intervention was carried out with the respondent sleeping on his back (supine lying), then the physiotherapist placed an indentation between the thumb and forefinger on the top of the respondent's knee and the other hand fixed the respondent's lower leg, then pushed the patella up and down and to the right and left side 10-20 times .

Lower extremity stretches the goal is to stretch out the shortened muscles. The target muscles being stretched are (gluteal, hip flexors, hip extensors, abductor hip, adductor hip, knee flexors, knee extensors, dorso ankle flexors and ankle plantar flexors). Perform each movement 3x with a count of 8 seconds each movement(Ramadhani et al., 2021).

Contract relax exercise aims to increase muscle flexibility and muscle activation. This exercise is performed on all lower extremity movements. Stretching movements are held for

10-15 seconds then contractions are carried out for 5-10 seconds. Do each move 4x(Mazloum et al., 2018).

Quadriceps set aims to increase muscle strength in the quadriceps. Instruct the patient to straighten their legs, place a towel or the therapist's fist under the patient's thigh or knee. Instruct the patient to press the towel or the therapist's fist for 8x counts and repeated 3x repetitions(Primary, 2021).

Active exercise aims to increase joint mobility, increase muscle strength through movements against gravity, increase blood circulation and improve coordination. Instruct the patient to extend the knee and then raise the leg in the direction of hip adduction, hip abduction, hip flexion and hip extension and adjust the sleeping position to the direction of the patient's movement. Can be done 5 times the count(Princess et al., 2021).

Bridging exercise aims to improve the coordination of the trunk, hip, knee & ankle and increase muscle strength. The initial position of the patient is hip and knee flexion & between the knees given the ball then instruct the patient to lift his buttocks and hold the ball between the knees then hold for 8 repetitions of 5 sets(Manitu et al., 2020)

In this case it shows that the exercise therapy given at T1 to T4 can improve the functional ability of the respondent because complaints of pain, tightness, muscle weakness and limitations of knee joint motion have been reduced so that the respondent can carry out daily activities related to the knee. This is influenced by the patient's adherence to exercise therapy at home.

## CONCLUSION

Based on research that has been done on Ny. S with a diagnosis of Bilateral Knee Osteoarthritis at PKU Muhammadiyah Bantul by giving manual therapy interventions in the form of Mulligan Mobilization With Movement (MWM) and patella mobilization and exercise therapy in the form of stretching lower extremities, contract relax, quadriceps set, active exercise and bridging exercise 4 times meetings

have experienced a significant increase in respondents. In patient Mrs. S experienced decreased pain, decreased tightness, increased joint range of motion, and increased functional ability. The results of this study are proven by several measurements. The level of pain intensity was measured using the Numeric Rating Scale (NRS), Goniometer to measure the range of motion of the joints (LGS),

Suggestions from this study to respondents are respondents to continue the exercise therapy that has been given by physiotherapists regularly at home. In addition, respondents were advised to reduce daily activities which could worsen the patient's condition.

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