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Exercise Therapy To Reduce Complaints In Osteoarthritis Patients – Case Report

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Abstract

Introduction:Osteoarthiritis (OA) is a disease joint degenerative whichinvolve the joints securingloads such as hip, knee and ankle foot. Osteoarthiritis occurs when there is abnormality radiography form the osteophytes, degree of sclerosis bone subchondral, loss of bone cartilage andsand formation ofcysts. Generally clinical symptoms of OA among others pain, stiffness and l imitation of motion. Other risk factors for knee OA are gender, obesity, joint injury, repetitive joint loading, osteoporosis and muscle weakness.

Case Presentation: In this research, the method used is *case report*. The case report comes from a 70-year-old Mrs. S patient at one of the hospitals in Magetan.The patient complained of pain in both knees, then the right knee was more painful than the left. Knee pain experienced by the patient or less since one year ago with no known cause. The pain gets worse when you sit for a long time and when you get up from sitting to standing.

Management and Outcome:The provision of isometric exercise and strengthening exercise is one of the exercise therapy that can be given to OA patients to reduce pain and increase muscle strength.

Discussion:Isometric exercise is given to patients because this exercise can reduce pain because when trained isometrically the muscle contracts/moves without lengthening the muscle because no change can minimize movement and reduce pain, besides that isometric exercise uses adaptive concepts to relieve the pain felt. Strengthening exercise is given to muscles that experience weakness. Strengthening exercise can increase the resistance and stability of the knee joint so that the load received by the joint decreases. By decreasing the joint load, the pain will decrease so that functional activity will also increase

Conclusion:Handling physiotherapy in the form of giving exercise therapy can reduce pain complaints in cases of osteoarthritis

Keyword: Osteoarthritis, strengthening, exercise

Introduction

Osteoarthritis (OA) is one of the degenerative problems that causes the articular cartilage to be damaged, besides that, it is followed by hypertrophy in the bone due to the formation of osteophytes or can also be called new bone and is followed by thickening of the joint capsule[1]. The development of OA in the early phase is relatively slow, but OA can cause a severe increase in pain that can make it difficult to move the joint.

Osteoarthritis (OA) is a common disease that arises in the presence of joint pain, stiffness, swelling, and instability resulting in functional impairment in daily activities[2]. OA is a degenerative joint disease that involves the breakdown of *cartilage* and the tissues surrounding the joints. Damage to the articular *cartilage* can weaken the muscles and possibly synovial inflammation. Articular damage is a major cause of pain and disability in the elderly[3.]

In OA conditions, there are several characteristics that will appear such as the onset of pain when doing activities and the pain is reduced when resting, the presence of joint stiffness that is felt in the morning, the appearance of sounds in the joints or crepitus and of course the area experiences obstacles when it will be moved. As a result, it can change the pattern of walking and is followed by swelling of the joints[4]. From the above characteristics, the patient will usually complain of various kinds of problems such as pain, then it is difficult to move either because of pain or because of limited movement and because of the appearance of swelling. In addition, it can also cause a person's mobility to be disturbed and can also cause disturbances in balance and reduce the function of the person[1].

The prevalence of OA total in indonesia to 34,3 million inhabitants in the yeer 2002 and reached 36.5 million inhabitants in the year 2007. In the estimate of 40% of the population aged over 70 years suffer from OA, and 80% of patients with OA have limitation of motion in various degress of light to savere which results in reducing their quality of life due to a fairly hight prevalance. Meanwhile, according to WHO there are 151 people worldwide who suffer from OA, in the Southeast Asia region alone it reaches 24 million people. OA is a chronic disease but the cause is not clearly known, but it can be characterized by gradual loss of cartilage in itself. Meanwhile, according to *National Centers for Health Statistics*, an estimated 15.8 million (12%) of adults with a vulnerable age 25-75 will have complaints OA[5]. WHO estimates that by 2020 OA will cause the fourth major disability[6].

Other risk factors for knee OA are gender (female), obesity, joint injury, repetitive joint loading, osteoporosis and muscle weakness[7]. Metabolism disease like a diabetes also can exacerbate OA. In addition, OA also occurred in the group of women aged peri-menopause because women have lower estrogen levels, obesity and also still active in work[4]. The effects of OA on the

large joints of the lower extremities result in reduced mobility and physical impairment that can lead to loss of independence. Thus OA has a great effect on activities of daily living and causes disability. So that it will interfere with walking activities, going up and down stairs, and difficulty in doing activities from sitting to standing[8]. In a study conducted by[9] when there is a decrease in functional activity in OA due to muscle weakness in the leg area.

According to the recommendations of the OA *Research Society International* (OARSI) 2014 in[10] rehabilitation is considered the main treatment for OA and is recommended for all OA patients. OA rehabilitation generally includes land and water -based exercise therapy *(aquatic therapy). Strengthening exercise*, weight control, *self-management* and education, biomechanical intervention, and participation in regular physical activities. *Strengthening* exercise therapy is aimed at strengthening the *quadriceps* muscle and maintaining joint mobility[8]. Exercises to reduce pain can use isometrics, because when isometric exercises provide an adaptation effect on these muscles, the muscles will get used to this exercise and the pain will decrease. The exercises will be given to patients include straight leg raise, hamstrings stretch and stretch leg.

Case Presentation

This case *study* was conducted at a hospital in Magetan with the patient Mrs. S aged 70 years, Muslim and a housewife.The patient complained of pain in both knees, then the right knee was more painful than the left. Knee pain experienced by the patient or less since one year ago with no known cause. The pain gets worse when you sit for a long time and when you get up from sitting to standing. Complaints will be reduced if you move a lot and walk a lot. At night the patient has difficulty sleeping because of knee pain. So far, he has often been taken to a general practitioner, if he takes medication his complaints are reduced but then he relapses. The patient had no previous medical history and had no history of comorbidities.

The goal to be achieved is to reduce pain and increase muscle ability so that functional activity increases.

Physical examination is carried out starting from a general examination to a special examination for OA. This vital sign examination needs to be done because the examination is a basic examination to find out how the patient's condition is. The results of the vital sign examination are for blood pressure 130/80 mmHg with pre-hypertension category, for checking pulse 88x/minute, breathing 21x/minute and temperature 36.4 °C all in the normal category then the last one is BMI with a value of 25, 7 fall into the category of obesity level 1 (according to WHO). The results of the examination of the patient are still in good condition so the patient can still continue the physiotherapy process but still be accompanied by a physiotherapist.

Inspection Inspection is divided into two, namely static and dynamic. For static examination, the following results were obtained; right knee appears larger than left knee; Both knees are not symmetrical ; In the standing position, kypolordosis appears; t visible varices on both lower legs up to the ankles. For dynamic inspection results are obtained; p there are currently running step short as oran g are afraid of falling and p asien seemed difficult time getting up from sitting to standing. Further palpation examination with the results; No pitting edema was found in the right or left knee and ankle; There is tenderness in the left ankle; No knee tenderness was found; Local temperature was normal.

This basic movement functional examination was carried out to determine the level of movement ability in these patients. In active and passive motion on the right and left knee there appears to be a limitation in the direction of flexion due to pain. As for isometric movement, the patient is still able to resist resistance but is accompanied by pain. For the examination of muscle strength, 4 results were obtained for both the right and left but for the right side it could fight more resistance than the left. So it can be concluded that there is muscle weakness in the legs, both the Quadricep and Hamstring muscles .

The first specific examination carried out was a pain test using the NRS where the results of the examination were; for silent pain 0/10 with no pain category, tenderness 4/10 with moderate pain category, pain is more felt in the medial and lateral parts of the knee, and for motion pain 6/10 moderate pain category the pain is felt when the patient is doing activity up and down stairs.

Muscle examination was carried out using the elderly muscle testing (MMT) the results of the examination of the right knee, which was a value of 4, which means that the muscle can have full ROM and can resist minimal resistance. Next is the joint range of motion (LGS) examination which is used to determine how well the patient is able to move actively or passively. The results of the LGS examination can be seen in table 1 .

Table 1 . Joint Scope of Motion Examination

joint	Active	Passive	Normal Value
Knee dextra	**S** 0-0-100 ^{o}	**S** 0-0-120 ^{o}	**S** 0-0-130 ^{o}
Knee sinistra	**S** 0-0-110 ^{o}	**S** 0-0-120 ^{o}	**S** 0-0-130 ^{o}

Further specific examination is the examination of functional activity in OA using skala jette. In this examination, what is measured is getting up from sitting, walking 15 meters and climbing stairs 3 steps. Then for the measurement, there are three dimensions, namely pain, difficulty and dependence. The results of the examination can be seen in table 2.

Table 2. Functional Activity Examination

Criteria	Painful	Difficulty	Dependency
Stand up from a sitting position	3	4	1
Walk 15 meters	3	3	1
Go up stairs 3 trap	4	4	2

For the pain dimension, the value 3 is moderate pain and for the value 4 is very painful, for the difficulty dimension, the value 3 is not easy and not difficult, the value 4 is rather difficult and the last is the dependency dimension, for the value 1 is without tools while tool 2 requires tools. help. The total score in the functional activity examination at this time was 25 with a moderate interpretation.

Management and Outcome

The physiotherapy program given to the patient is in accordance with the complaints experienced by the patient. The purpose of this therapy is to reduce pain and maximize muscle strength in order to increase functional activity in these patients. The table below is the physiotherapy action plan that will be given to the patient.

Table 3. Physiotherapy Intervention Plan

Intervention	**Dose**	**Aim**
Straight leg raise exercise	F : every day/week I: 1 set (1 set of 10 repetitions) T : 3 minutes/day T : Exercise	To increase muscle strength
Harmstring stretch exercise	F : every day/week I : 1 set (1 set of 10 repetitions) T : 3 minutes/day T : Exercise	To increase muscle strength
Leg stretch exercise	F : every day/week I : 1 set (1 set of 10 repetitions) T : 3 minutes/day T : Exercise	To increase muscle strength

Complaints experienced by patients are pain in both knees and a decrease in muscle strength. After doing the straight leg raise, hamstring stretch and leg stretch exercises for 1 week , the results are as shown in Figure 1 and Figure 2. The evaluation was carried out three times for 1 week.

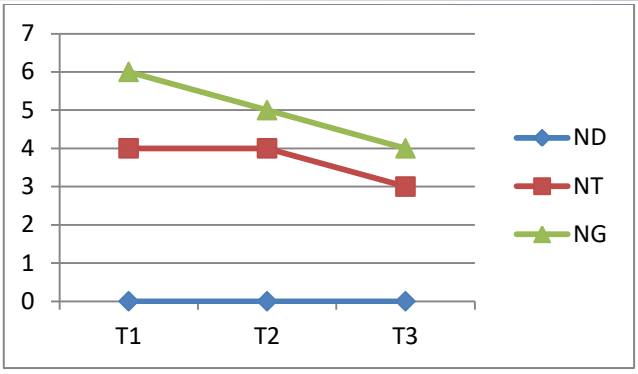

Figure 1. Pain Evaluation

Pain evaluation was carried out using NRS, the evaluation was carried out three times within one week. For the silent pain category, the result is 0, that is, there is no search, for pain tenderness in the first evaluation a score of 4 is obtained with the moderate pain category and at the last evaluation the tenderness has decreased to mild pain with a value of 2, while for motion pain it has also decreased from the first evaluation with a value of 6 and at the last evaluation it became a value of 4 even though it was the same in the moderate pain category but the pain value continued to decrease.

The next evaluation is functional activity which is measured using the jette scale. And the results of the evaluation can be seen from table 4.

Table 4. Evaluation of functional activities

Criteria	Painful	Difficulty	Dependency
Stand up from a sitting position	2	3	1
Walk 15 meters	2	2	1
Go up stairs 3 trap	4	4	2

After 1 week of physiotherapy intervention and evaluation, it can be seen that there is an increase in functional activity in the patient. For evaluation of the pain category on examination standing from a sitting position and walking 15 meters experienced a decrease, initially the value of 3 was moderate pain, it dropped to a value of 2, namely mild pain and for activities up and down stairs the pain value was still the same, namely 4 with very painful category. Furthermore, the evaluation of the difficulty category for standing and walking activities decreased by one level. Standing activities can now be done not easy and not difficult, while walking 15 meters is done rather easily, but for activities up and down stairs it is still the same, namely the value 4. The last category is dependence for this category is still the same at the time of the first evaluation, namely for waking activities to stand and walk 15 meters does not require assistance while going

up and down stairs requires assistive devices. The total score of the jette scale examination is 21 with a mild category.

Discussion

Knee OA is one of the most common causes of musculoskeletal disorders and joint degenerative disorders. The prevalence of knee OA is most common in the elderly population, especially elderly women in Asia. Osteoarthritis (OA) also known as degenerative arthritis is a mechanical disorder that involves the degradation of the joints, including the articular cartilage and subchondral bone. The word "osteoarthritis " comes from the Greek words "osteo‟ meaning bone", arthro‟ meaning joint, and " is‟ meaning inflammation[11].

Pain and muscle incompetence will increase with a decrease or weakness in muscle strength, in OA patients, especially the quadriceps muscle. Muscle is one of the important components that can stabilize the joint, and a decrease in quadriceps muscle strength can cause knee OA to worsen. Vice versa, with an increase in the quadriceps muscle, it can help protect and repair problems that arise due to pain due to muscle weakness. One way to increase muscle strength is by strengthening exercises on the quadriceps muscles. Exercise therapy is one of the recommended modalities to increase quadricps muscle strength in this case. The purpose of providing exercise therapy is to increase local muscle strength, increase joint range of motion, improve muscle performance. Although exercise therapy cannot actually stop the degeneration process, it is hoped that it can slow its progress, and can relieve symptoms that arise, preventing complications resulting from the degeneration process[12].

Quadriceps isometric muscle strengthening exercises using straight leg raises are exercises to contract muscles without causing movement or can be called static exercises which can stimulate joint pain. Movements performed when performing isometric exercises will produce muscle force without changing length and causing little or no joint motion. Isometric exercises are good and suitable for clients who cannot tolerate repetitive joint movements such as in conditions of joint pain or inflammation[13].

According to research conducted by[14] stated that strengthening the quadriceps muscle has a good effect on reducing pain, after the pain is reduced, the functional activity of knee OA patients can also increase. When a patient has good quadriceps muscle strength, the patient's knee pain will also be much less and their functional activity will also be better than patients who have low quadriceps muscle strength. When the strength of a muscle is good or strong, the muscle can provide a stable effect on the joint area, because the knee joint is in good alignment, but it can also reduce the impact and minimize the effects of the impact. So it can be estimated that increased

muscle strength is one of the main causes of reducing pain and disability[15].

The recommended exercise for patients with knee OA is muscle strengthening exercise without *weight bearing* because of its specific nature and more comfortable for patients who experience pain[16]. An increase in quadriceps muscle strength can prevent deterioration in the structure of the knee joint.

Strengthening Exercise is a strengthening exercise in muscles that uses resistance in the form of self-weight within oneself or additional load from outside. These exercises can be done regularly, planned, repeatedly and increase the load[17]. When doing strengthening exercises , it will cause changes in muscle morphology, namely the larger the diameter of the muscle fibers, the stronger the muscle will be, and the bigger the muscle is formed, the more mitochondria will be[18].

The advantages of giving strengthening exercises are that it can increase performance in muscles, increase strength in tendons; ligaments; and intramuscular connective tissue, an increase in bone mineral density or reduced bone demineralization, a decrease in stress during daily activities, a reduced risk of injury to soft tissues during daily activities, a possible increased capacity to repair and heal soft tissue from damage, allowing for an increase in balance in the body, an increase in functional activities in daily life, a positive change in body composition (increase in muscle mass or a decrease in body weakness), a decrease in disability and an increase in quality of life[19].

Strengthening exercise will give effect to the muscle tissue to change the environment of the matrix fibers irregularly through the joint between the motion slowly and will stimulate mechano growth factor due to an increase in lubrication as a condition of the increasing number of plastin substances which have benefits for new tissue replacement. This substance consists of protein amino acids that will be synthesized by facilitating slow movement. In this state, it will process the precipitate and a new distance will be formed in regulating the synthesis of collagen. This mechanism aims to reduce stiffness by increasing contractile protein and the oxidation system in the quadriceps muscle belly, characterized by increased muscle oxygen intake as the beginning of an increase in metabolism and repair of damaged tissue by increasing the production of new tissue, it will increase the range of motion of the knee joint. increase the strength of the quadriceps muscle, increase the resistance and stability of the knee joint so that the load received by the joint decreases. By decreasing the joint load, the pain will decrease so that functional activity will also increase[20].

Conclusion

Osteoarthritis (OA) is a common disease that presents with joint pain, stiffness, swelling,

and instability resulting in functional impairment in daily activities. OA is a degenerative joint disease that involves the breakdown of cartilage and the tissues surrounding the joints. Damage to the articular cartilage can weaken the muscles and possibly synovial inflammation. Articular damage is a major cause of pain and disability in the elderly. To reduce knee OA complaints that are felt by patients, they can be given isometric exercise therapy with the concept of applying adaptation and strengthening muscle strength exercises where these exercises can reduce pain that arises and can also increase muscle strength in OA patients.

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