



## Management of Genu Sinistra Osteoarthritis (Oa) With Ultrasound (Us) Modality, Transcutaneous Electrical Nerve Stimulation (Tens) And Strengthening Exercise

Noviyanti Dwiputri<sup>1</sup>, Heri Purnama Pribadi<sup>2</sup>

<sup>1</sup>Physiotherapy Study Program, Faculty of Health, University of Muhammadiyah Gresik

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

**Abstract.** Osteoarthritis (OA) is a degenerative disease characterized by the degradation of cartilage (cartilage) which causes bones to rub against each other, causing joint stiffness and pain. One of the physiotherapy treatments that can reduce pain and increase joint range of motion is electrotherapy and strengthening exercise modalities. The purpose of this case study is to determine the effect of electrotherapy modalities such as ultrasound (US), transcutaneous electrical nerve stimulation (TENS) and strengthening exercise on reducing pain and increasing the range of motion of the knee joint in cases of knee osteoarthritis. This case study was conducted at RSUD Ibnu Sina Gresik, for 2 months. The results of the case study show that the combination of US, TENS and strengthening exercise can reduce pain, resulting in an increase in ROM. Measurement of pain and ROM values using the NRS scale. The results of the initial measurements showed the value of silent pain was 2, the value of tenderness was 4, and the value of motion pain was 5 decreased to a silent pain value of 0, the value of tenderness was 2 and the value of motion pain was 2. Meanwhile, ROM showed an increase in initial ROM of treatment from 110° to 125. °. The conclusion of this case study shows that the administration of US, TENS, and strengthening exercise in the case of osteoarthritis of the left knee can reduce the degree of pain and increase the joint range of motion in the patient's left knee.

**Keywords:** Osteoarthritis (OA), Ultrasound (US), Transcutaneous Electrical Nerve Stimulation (TENS) and Strengthening Exercise.

### 1. Introduction

One of the *degenerative* that often occurs in the elderly is *osteoarthritis*. *Osteoarthritis* (OA) is a disorder of the joints that move, which can reduce the degree of physical and mental health. This disease is chronic, runs progressively, is inflamed, and is characterized by the erosion of joint cartilage and the formation of new bone on the joint surface (Pratama, 2019). Causes of OA is not known for certain, but there are several factors that are suspected to be the cause of OA, such as: workers who use the knee joint a lot, in addition to sports who experience trauma, age, gender, obesity, and *overuse* (Alfarisi, 2018; Pratiwi, 2015). In Indonesia, OA is a rheumatic disease that is more common than other rheumatic diseases. *Osteoarthritis* increases with age. The incidence of knee OA is different in each age group, the 15-24 year age group is 1.3%, the prevalence rate continues to increase in the 24-35 year age range by 3.1% and the 35-44 year age range by 6.3%. . In East Java in 2018 the prevalence of *osteoarthritis* was 6.72%, this is related to the presence of cartilage degeneration, and the prevalence of joint disease by gender in Indonesia tends to be higher in women than in men. In Indonesia, OA *genu* has a fairly high prevalence of 6.13% in men and 8.46% in women (RI, 2018). The high incidence of *osteoarthritis* in Indonesia requires appropriate physiotherapy management. Management of physiotherapy according to PERMENKES No. 65 of 2015 aims to develop, maintain

and restore body movement and function throughout the life span by using manual handling, movement enhancement, equipment (physical, electrotherapy and mechanical) function training, and communication. Physiotherapy management in patients with OA plays a role in reducing symptoms. The most common symptoms in OA are joint stiffness and lack of proprioception and decreased quadriceps muscle strength. This can lead to impaired immobilization and decreased functional activity. Knee OA is also often accompanied by several types of pain symptoms, including pain at rest, when moving and pain when walking. Pain gets worse when a person performs daily activities, so that it can reduce the ability to carry out daily activities. In an effort to reduce pain and increase *range of motion* (ROM), physiotherapy uses electrotherapy modalities such as *ultrasound* (US), *transcutaneous electrical nerve stimulation* (TENS), and *strengthening exercises* (Wahyu Palguna et al., 2018).

## 2. Methods

This research is a case study conducted at RSUD Ibnu Sina Gresik, for 2 months. This research uses *observational action research* or the action research used is a case study. The source of the data taken was primary data with the observation subject used were patients with *osteoarthritis genu sinistra* who received physiotherapy services at Ibnu Sina Hospital, Gresik Regency, Mechanical Rehabilitation Poly, Physiotherapy section. The research subjects were based on predetermined criteria, namely: knee OA patients aged 50 years, female. The intensity of silent pain 2, tenderness 4 and motion pain 5 with a *Numeric Rating Scale* (NRS) and X-rays showed the presence of *osteophytes* in the patella. Therapy was carried out 6 times.

## 3. The results

of this study aimed to determine the effect of ultrasound, transcutaneous electrical nerve stimulation and strengthening exercise in reducing pain and increasing ROM. The patient with the initials Mrs. S 50 years old was diagnosed with *osteoarthritis genu sinistra*. The patient since May 10, 2021 has complained of pain in the left knee. From the initial examination, several physiotherapy problems were found, including pain when flexing the left genu, limited movement in the left genu and muscle spasms in the left quadricep. The intervention was given to patients 2 times a week using continuous wave US, 1 MHz frequency, 1.2 w/cm<sup>2</sup> intensity, 100% duty cycle and 7 minutes duration, TENS with 27 mA intensity and 15 minutes duration. Next is the strengthening quadriceps sitting with 10 counts of resistance and 8-12 repetitions and the theraband exercise is done 8-12 repetitions.

**Table 1** Results of Evaluation of

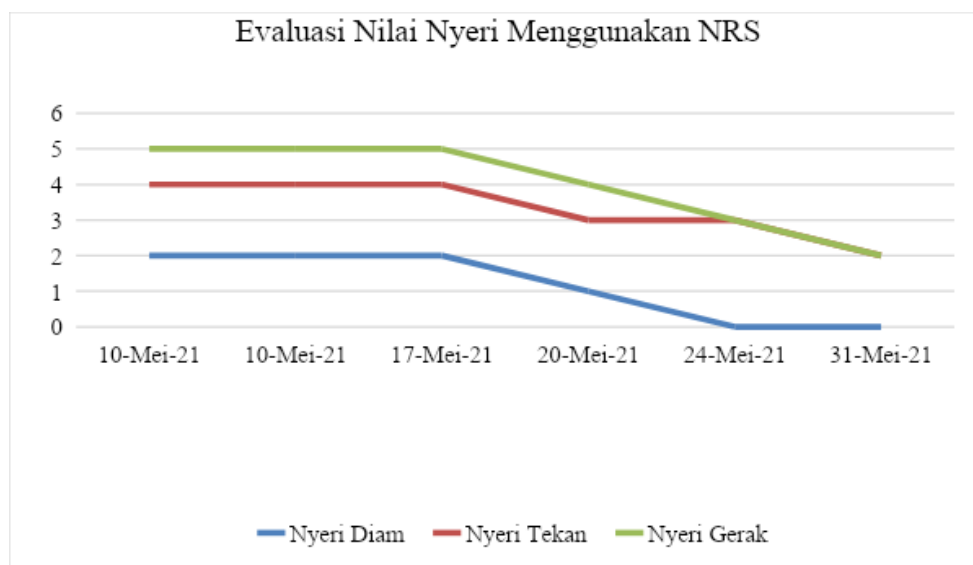
Physiotherapy Problems	T0	T1	T2	T3	T4	T5
Silent knee pain (NRS)	2	2	2	1	0	0
Left knee motion pain (NRS)	4	4	4	3	3	2
Left knee tenderness (NRS)	5	5	5	4	3	2
ROM knee flexion	110 o	110 o	110 o	115 o	120 o	125 o

Source: Primary data (May, 2021)

From the table above, the results of the reduction in left knee pain are obtained from NRS measurements. May 10, 2021 (T0) or pre-treatment is the first examination of the patient. The value of pain examination is T0 with the result of silent pain score 2, tenderness value 4, and motion pain value 5. At treatment T5 dated May 31, 2021, there was a decrease in pain value in

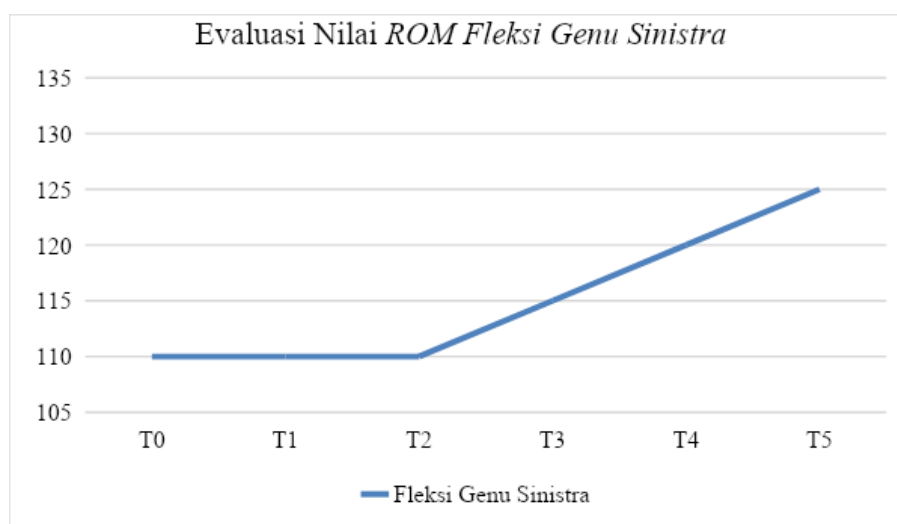
tenderness and movement, the value of tenderness became 2, motion pain was 2, and silent pain remained 0.

For ROM values there was a significant increase, on May 10, 2021 (T0) pre-treatment ROM values of  $110^{\circ}$  to (T5) on May 31, 2021 there was a very significant increase to  $125^{\circ}$ .



**Figure 1** Graph of pain reduction with NRS

From the graph above shows May 10, 2021 (T0) or pre-treatment is the first examination of the patient. The value of the pain examination is T0 with the results of a silent pain score of 2, a tenderness value of 4, and a motion pain value of 5. After the first treatment was carried out on 10 May 2021 (T1) or post-treatment and the second treatment (T2) on 17 May 2021 to the patient there has been no decrease in the value of silent pain, pressure, and motion. In the third treatment (T3) on May 20, 2021, there was a decrease in the value of silent pain to 1, the value of tenderness to 3, the value of motion pain 4. In the fourth treatment (T4) on May 24, 2021, the value of silent pain decreased to 0, the value of motion pain becomes 3, the value of tenderness is still 3. In the last treatment (T5) which was carried out on the patient on May 31, 2021, the results showed a decrease in the value of tenderness to 2, motion pain 2, and silent pain remained 0.



**Figure 2** Graph increase in ROM with a goniometer Graphic

image 2 on (T0) or pre-treatment which is the first examination of the patient on 10 May 2021 and the second treatment (T2) on 17 May 2021 shows the range of motion (ROM) of the left genu flexion movement of 110° and the extension movement of the left genu has a normal value of 0°. In the third treatment (T3) on May 20, 2021, it showed an increase in ROM in the flexion of the left genu with a value of 115°. In the fourth treatment (T4) on May 24, 2021, it showed an increase in ROM of flexion of the left genu with a value of 120°. In the last treatment (T5) which was carried out on the patient on May 31, 2021, it also showed an increase in ROM of flexion motion of the left genu which was valued at 125° and extension motion remained normal at 0°.

#### 4. Discussion

*Transcutaneous Electrical Nerve Stimulation (TENS)* can reduce pain because it can activate large-diameter nerve fibers so that small-diameter nerve fibers are blocked from reaching the central nerve and close the *gate control*. Closing *gate control* causes pain information to be cut off and pain stimuli do not reach the brain. modality *TENS* can help reduce pain (Dwi & Fauziah, 2020). The results of this study are in line with Aditya Denny Pratama's research (2019) which shows that the *TENS* modality can reduce pain. In this study, it was conducted 2 times a week 6 times using the *TENS* method with an intensity of 30 mA and a duration of 15 minutes. The combination with *ultrasound* can reduce pain. Pain is reduced due to the influence of rubbing the *transducer*. thermal and causes *The rubbing of the transducer produces a micromassage effect which* an increase in the flexibility of connective tissue, accelerates the process of tissue healing, and can improve blood circulation which causes muscle relaxation (Kuswardani, 2018). The pain value during the *treatment (T0)* to *treatment (T2)* has not experienced a decrease in pain because between the *the first treatment* and *treatment* there is a gap of 1 week. Pain decreased significantly when *treatment* the 3rd *treatment*, because the gap between *treatments* about three. Pauses that are too long can reduce the effectiveness of the *treatment* given.

The addition *strengthening exercise* patients is *OA genu* beneficial to reduce pain and increase *ROM*. *Strengthening exercise* can reduce *cytokine* fluid in *synovial* patients *OA*, inhibit cartilage degradation, and improve pain symptoms. *Cytokines* are one of the chemical mediators of inflammation. Decreased *cytokine* causes the mechanism of *nociceptor* stimulation by *noxious* inhibited and the process of pain mechanisms is inhibited (Marlina, 2015). The types *strengthening exercises* used in this study are *quadriceps setting* and *TheraBand exercise*. *Quadriceps setting* is carried out with the principle of exercise involving muscle contraction and generating *force* without changing muscle length and with little or no joint movement. This can reduce pain so that muscle strength can increase quickly. The frequency of exercise given is 2 times a day with 8-12 repetitions and 10 seconds of resistance contraction. The resistance given should not exceed 10 seconds because it can cause *fatigue*. While *TheraBand exercise* aims to increase muscle strength. Increased muscle strength causes the ability of *endurance* and body balance to increase as well. In addition, *theraband exercise* causes an increase in tissue flexibility so that it can reduce joint pain and increase *ROM*. In this study, the frequency of exercise was once a day with 2 sets and 8-12 repetitions.

The results of this study are supported by the results of research by Jamtvedt (2008) which shows that 90% of the most commonly used types of exercise therapy are *muscle strengthening exercises*. Researchers revealed that giving exercise therapy is highly recommended because it gives good results, namely as much as 92% in reducing pain and 85% in increasing muscle strength. Syantika Dhar and Shanam Agarwal (2018), also revealed the same thing where *strengthening exercise* with *theraband* in a study conducted for 12 weeks with a dose of one set of 8 repetitions and performed once a day for 30 minutes was able to show an effect in reducing pain. Nurun Laasara (2018) in his research proves that *quadriceps isometric* performed twice a week for 4 weeks have good benefits for reducing pain and increasing *ROM*.

## Conclusion

The results of this case study indicate that the intervention of TENS, US, and *strengthening exercise* can reduce pain and increase functional capacity in patients with *knee osteoarthritis*.

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