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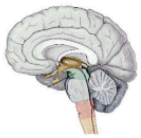

THE EFFECT OF ADMINISTERING TENS COMBINED WITH ISOMETRIC EXERCISES ON PAIN VALUES AMONG PATIENTS WITH KNEE OSTEOARTHRITIS AT THE IHC LAVALETTE HOSPITAL MALANG

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ABSTRACT

Osteoarthritis causes changes within the digestion system of joint cartilage. These changes are within the shape of an increment within the action of chemicals that damage the macromolecules of the joint cartilage network, went with by a diminish within the blend of collagen and proteoglycans. This causes a decrease in proteoglycan levels, changes in the properties of collagen and reduced water content in joint cartilage causing pain in the knee. In this research, researchers used quantitative research methods or tested directly.

The inquire about plan utilized by analysts is one bunch pretest-posttest plan. Within the One-Group Pretest-Posttest Plan the subordinate variable is measured as one bunch some time recently (pretest) and after (posttest) a treatment is given. The sample used in this study was 15 respondents who were given a combination of Transcutaneous Electrical Nerve Stimulation and isometric exercises. P value = 0.001 < 0.05 Conclusion: H0 is rejected. H1 is accepted. There's a noteworthy impact of giving a combination of Transcutaneous Electrical Nerve Incitement and isometric works out on torment scores in patients with knee osteoarthritis at Lavalette Hospital, Malang.

INTRODUCTION

Knee osteoarthritis (KOA) is a degenerative disorder characterized by weak tendons and muscles, limited mobility, pain, articular cartilage damage, and new bone growth in the joint area (Sartoyo, Pradita dan Nurul Halimah 2022). This disease makes the joint surface, causing pain (Taruna Nagara et al. 2022). OA is a metabolic imbalance in cartilage that causes structural damage, and the cause is still unknown. In osteoarthritis, there are changes in the metabolism of articular cartilage. These changes are characterized by increased enzyme activity that degrades articular cartilage matrix macromolecules, followed by a decrease in collagen and proteoglycan synthesis. These conditions cause a decrease in proteoglycan content, a decrease in water content in articular cartilage, and changes in collagen properties. Symptoms may include joint pain, stiffness, swelling, and limited movement. Osteoarthritis is primarily caused by aging and joint overuse, but genetics, injury, and excess weight can also contribute. Pain management, physiotherapy, anti-inflammatory medications, and, in severe cases, joint replacement surgery may be necessary.

Transcutaneous Electrical Nerve Stimulation (TENS) is a non-pharmacological therapy that effectively reduces pain in patients with knee osteoarthritis (Sri Suwarti *et al.*, 2021). TENS activates type Aβ nerve fibers, which transmit nerve impulses at high frequencies and low intensity. Type Aδ and C nerve fibers release endogenous opioids into the spinal cord, reducing activation of pain-causing sensory pathways (Haryono *et al.* 2021). Isometric exercise involves muscle contraction without joint movement,

with the goal of reducing pain around the knee joint and improving muscle strength. Exercises are performed to strengthen muscles. Consistent isometric movements provide physiological adaptations in the form of contributing to providing energy through metabolic pathways, the physiological effects of the body to increase muscle strength that lasts for 24-48 hours (Sartoyo, Pradita, and Nurul Halimah, 2022).

Pain causes people with osteoarthritis to reduce their functional activity level. Pain in the knee joint develops slowly or gradually; it appears during activity and disappears at rest. Sometimes there is a rash or swelling in the joint effusion or soft tissue, which indicates inflammation. Then one of the following isometric exercises is performed namely quadriceps setting, which is a type of muscle contraction exercise that does not alter joint motion or muscle length. The following types of isometric exercises are frequently interpreted as static contractions: muscle contractions when the joint is at rest (Griadhi 2017). Quadriceps Setting Exercise is designed to strengthen the quadriceps femoris muscle around the knee. It is expected that strengthening this muscle will reduce the load on the knee joint and thus the intensity of pain experienced by people with knee osteoarthritis.

The purpose of using TENS modalities and isometric exercises is to eliminate or reduce pain, maintain joint integrity, improve functional status, and reduce deformity and instability. Active methods, such as isometric exercises, have been proven to improve quality of life and functional performance in patients with knee osteoarthritis. Exercises that improve frequently necessitate significant commitment from patients over an extended period of time rather than just a day or two. However, their effectiveness has been proven. Previous studies have shown that they have a small to moderate effect on pain and thus can slightly improve functional ability (Griadhi 2017).

METHODS

In this study, the researchers applied quantitative research methods or conducted direct testing. The research design used was a one-group pretest and posttest design. In the one-group pretest-posttest design, the dependent variable was divided into two groups namely before treatment (pre-test) and after treatment (post-test). After a group has been treated, the values before and after were compared. The advantage of this study is that the same measurement equipment can be used to compare values before and after treatment for the same participants (William and Hita 2019). The measuring instrument used a visual analogue scale (VAS) with criteria for values 1-3 mild pain, 4-6 moderate pain, 7-9 severe pain, and 10 very severe pain. The patient was asked to mark along the line based on the intensity of their pain. The distance was then measured from the left border to the mark given by the patient, which was the score that showed the level of pain intensity (Widiarti, 2016:98).

The following study was carried out at the Medical Rehabilitation Clinic of IHC Lavalette Hospital in Malang. The researchers chose this research site because they found a large number of Bilateral Knee Osteoarthritis cases in the Medical Rehabilitation Poly of IHC Lavalette Hospital Malang. The following study was conducted 12 times, with a dose of three times per week in 2023. This study applied a qualitative approach with the aim of investigating a specific case. The sample for the following study was Bilatral Knee Osteoarthritis outpatients at IHC Lavalette Hospital Malang in 2023 who met the exclusion and inclusion criteria, with 15 subjects.

RESULTS AND DISCUSSION

A. General Characteristics of The Study

Table 1. Characteristics of Respondents by Age

Age	Total	Percentage
48	2	13.3%
49	2	13.3%
50	1	6.7%
53	1	6.7%
55	1	6.7%
56	2	13.3%
58	1	6.7%
59	1	6.7%
60	1	6.7%
63	1	6.7%
68	2	6.7%
69	1	6.7%
Total	**15**	**100%**

Based on table 1 on the Characteristics of Respondents by Age, the results of the respondents of this study are aged over 45, in terms of age 48,49 years (13.3%) and 56 (13.3%) are the highest percentage at the age of 45.

Table 2. Characteristics Of The Respondents By Gender

Gender	Total	Percentage
Female	8	53.3%
Male	7	46.7%
Total	**15**	**100%**

From Table 2, the results of the respondents of this study show that the percentage of male is 46.7% and the percentage of female is 53.3%. Female are more dominant than male.

B. Presentation of The Research Results

	N	Median (Minimum-Maximum)	P Value
Pre Treatment	15	7 (4 – 7)	0,001
Post Treatment	15	4 (3 - 5)	

Source: Primary Data of 2023

Based on the results of the Wilcoxon Signed Rank Test Table report, the p value = 0.001 <0.05. Conclusion: H0 was rejected H1 was accepted. There was a significant effect of administering TENS combined with isometric exercises on pain values in patients with knee osteoarthritis at Lavalette Hospital Malang.

Knee osteoarthritis is a degenerative disease that causes muscle and tendon weakness, limiting movement, artricular cartilage damage, and new bone growth in the joint area (Sartoyo, Pradita, & Nurul Halimah 2022). This disease makes the joint surface, which causes pain (Taruna Nagara *et al.* 2022). Based on Table 5.1, the frequency of OA was more dominated by female than male (Claudia 2020). Osteoarthritis was more common in female, so female was more likely to develop it due to reduced estrogen and progesterone hormones, which caused calcification of the knee joint. Knee osteoarthritis is more

common in women than in men, with a prevalence of 10-15% at 35-35 years and -45% at 65 years (DAŞKAPAN *et al.* 2013). The global prevalence of osteoarthritis is 9.6% in male and 18% in female over 60 years old (WHO, 2017). The prevalence of osteoarthritis in Indonesia is 5% in the population under 40 years, 30% in the population aged 40 to 60 years, and 65% in the population aged over 61 years (‘Mutmainah, 2019).

The Wilcoxon Signed Rank Test Table report showed a p-value of 0.001, which was less than the significance level of 0.05. Conclusion: H0 was rejected H1 was accepted. The combination of TENS and isometric exercise had a significant effect on pain values in patients with knee osteoarthritis at Lavalette Hospital Malang. Transcutaneous Electrical Nerve Stimulation (TENS) could reduce pain associated with knee osteoarthritis. TENS is used with a pad attached to the respondent’s anteromedial and anterolateral knee joints for 15 minutes at a frequency of 100Hz (Sri Suwarti, 2021). Sensory nerve stimulation were able to activate nerve pathways that carried non-pain signals, which competed with pain signals to influence pain perception in the brain. Isometric quadriceps exercises performed in accordance with patient compensation will provide strength to the smooth muscles of the extremities, enabling the muscles to relax and reduce pain (Achmad Fariz *et al*, 2021). Isometric exercises involve muscle contraction without joint movement. Isometric exercise involved holding muscles in a specific position while applying pressure or resistance. Meanwhile, TENS is a technique that uses electrical stimulation to stimulate specific nerves in the skin through electrodes placed on the pain-causing area. This helps to divert pain signals to the brain and stimulates the release of endorphins, which are natural pain relievers. Combining isometric exercises with TENS can provide additional benefits.

CONCLUSIONS AND RECOMMENDATIONS

There is an effect on pain values before and after the administration of TENS combined with isometric exercises for knee osteoarthritis at IHC Lavalette Hospital Malang. This study was conducted for approximately one month on weekdays Monday through Saturday from 07:00 - 17:00, with sampling done alternately during exercise and/or TENS in the medical rehabilitation room of IHC Lavalette Hospital Malang. It is recommended to conduct further research with a larger sample of knee Osteoarthritis patients and involving a more detailed control group to confirm the results of this study. Further research can also focus on specific aspects of the therapy, such as optimal duration, frequency, and intensity, to gain deeper insights into the results.

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