



Case Study: Providing Tens and Retrowalking on Knee Osteoarthritis Functional Activities

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Abstract

Osteoarthritis is a degenerative joint disease associated with cartilage damage in the joints, involving a complex interactive process of joint degradation, consisting of repair processes in the cartilage, bone, and synovium followed by secondary components of inflammation. This disease is commonly found in patients over the age of 50. This study aims to investigate the effects of TENS (Transcutaneous Electrical Nerve Stimulation) and Retrowalking on functional activity in osteoarthritis knee in the year 2023. The research design employed is a quasi-experimental one-group pretest-posttest design. The population in this study was 232 individuals, with a sample size of 10 respondents. Sampling technique was done through purposive sampling. Bivariate analysis results indicate the impact of TENS and Retrowalking on functional activity in osteoarthritis knee, with an average increase in functional activity of 23.270 and a significance level (α) of 0.005. It can be concluded that TENS and Retrowalking have been shown to affect the increase in functional activity in osteoarthritis knee. Therefore, it is hoped that hospitals can implement TENS and Retrowalking interventions for osteoarthritis knee patients.

Keywords: Osteoarthritis Knee, Functional Activities, TENS, Retrowalking

Introduction

Osteoarthritis is a degenerative joint disease associated with damage to the joint cartilage, where there is an interactive degradation process of the joint, consisting of repair processes in the cartilage, bone, and synovium followed by secondary components of the inflammatory process. (Suriani & Lesmana, 2019).

With the development of various fields of life, particularly in healthcare, there have been changes in the behavior and lifestyle patterns of society. Health development entails efforts to enhance the community's capacity to achieve health. This health development has resulted in

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demographic transition and epidemiological transition. Demographic transition refers to changes in population patterns that occur as time passes, including aging. Epidemiological transition occurs due to government efforts to reduce infectious disease rates, while, on the other hand, diseases associated with aging are increasing. Consequently, degenerative diseases caused by physiological changes and related to the elderly population and aging factors emerge, including joint inflammation known as arthritis. One inflammatory joint disease is osteoarthritis.

The prevalence of knee osteoarthritis is higher compared to other joints, as the knees are more frequently used to support body weight and endure strenuous activities (Marlina, 2015). Based on the National Center for Health Statistics, an estimated 15.8 million adults, or 12% of individuals aged 25 to 74 years, exhibit symptoms of osteoarthritis, with 9.6% being men and 18% women (Kaur & Sharma, 2015).

In Indonesia, the prevalence of osteoarthritis among individuals over 60 years old reaches 65%. Osteoarthritis can affect both men and women, and young people are also susceptible to osteoarthritis, possibly due to knee joint injuries (Wibowo, 2017).

Osteoarthritis is one of the top ten most disabling diseases in developed countries. Worldwide estimates suggest that 9.6% of men and 18.0% of women aged 60 years old have symptoms of osteoarthritis. 80% of osteoarthritis patients experience mobility limitations, and 25% are unable to perform their daily activities (Organization, 2018). The prevalence of infectious diseases has decreased from 2013 to 2018, whereas non-communicable diseases, such as chronic joint diseases or rheumatism, remain prevalent. The prevalence of joint diseases diagnosed by healthcare professionals in Indonesia is 7.3% (Riskesdas, 2018).

In 2018, the prevalence of knee osteoarthritis in West Sumatra was 11.9%, and in the city of Padang, it was 8,256 cases (Dinkes, 2018).

According to Minister of Health Regulation No. 80 of 2013, physiotherapy is a health service aimed at individuals or groups to restore, develop, and maintain body function throughout life using manual handling, movement enhancement, and equipment (physical, electrotherapeutic, and mechanical) functional training and communication (Kocyigit, 2015).

Physiotherapy is a rehabilitation intervention to prevent or minimize physical limitations due to injury or disease. Physiotherapy can be performed on patients of all ages with various goals, ranging from relieving back pain to preparing for sports and childbirth. The goal of physiotherapy is to restore normal body function after illness or injury (Kemkes, 2021).

Transcutaneous Electrical Nerve Stimulation (TENS) is a relatively inexpensive and safe non-pharmacological therapy. TENS is a physiotherapy modality that produces low-frequency electrical currents using an electrical stimulation applicator on the skin to alleviate pain. TENS works by delivering small electrical impulses through electrodes that have adhesive so they can be attached to the skin (Okonkwo et al., 2018).

Retrowalking provides benefits to the elderly to improve functional activity and perform daily activities. Retrowalking is also considered a safe exercise because the force on the patellofemoral joint can increase functional activity. Retrowalking is one of the close kinematic

chain exercises, where in the retro-walking gait cycle starts from the toe on the limb to the foot, next on the same limb. When walking backward, it will reduce the pressure on the patellofemoral joint, which will result in a reduction in articular cartilage trauma (Wadha & Hande, 2016)

Arthritis treatment that does not use physical activity (exercise) such as retrowalking exercise. The retrowalking exercise method is the most safe and effective exercise in rehabilitation programs because it can reduce the force of pressure on the patella femoral joint. Retrowalking can increase quadriceps muscle strength and also increase cardio pulmonary (Wadwa & Hande, 2016).

Based on the background above, there are problems that occur due to a decrease in functional activity due to bone degeneration, namely osteoarthritis. Based on the incidence of osteoarthritis above, this degenerative disease is common in Indonesia, especially West Sumatra and Padang. Osteoarthritis is chronic, cannot be cured but can be given intervention and exercises to increase functional activity in the knee.

Literature Review

Functional ability is defined as a person's ability to perform specific tasks related to daily activities. In osteoarthritis knee, pathology in the knee joint prevents a person from carrying out functional activities properly, such as getting up from sitting, squatting, standing, kneeling, walking up and down stairs, and other activities that burden the knee joint and require weight bearing. (Artika, 2020).

TENS is a physiotherapy modality that works using the gate control theory method, namely to reduce pain which will then increase the ability for functional activities and this method works by reducing pain in sufferers of knee osteoarthritis (Wahyu Palguna et al., 2018).

Retrowalking is one of the close kinematic chain exercises, where the retrowalking walking cycle starts from toe on of a limb to the next leg on the same body. When walking backwards it will reduce the compressive force from the patellofemoral joint which will have an impact on reducing articular cartilage trauma. (Wadhwa et al., 2016).

Research Design

This research was conducted using a quasi-experimental design with a pre-post test design in one group (one group pretest-posttest design). This research reveals cause and effect involving a group of subjects. The subject group was observed first, then re-observed after the intervention was carried out.

Results and Discussion

- 1. Average Functional Activity before TENS and Retrowalking are given to Functional Activity in Osteoarthritis Knee**

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Based on table 1, it shows that the average (mean) of the 10 respondents' functional activity before giving TENS and Retrowalking for Osteoarthritis Knee was 54,790. The minimum functional activity score is 40 and the maximum is 65.6.

Variabel	N	Mean	Minimum	Maksimum
Pretest	10	54,790	40	65,6

Osteoarthritis knee according to the American College of Rheumatology is a heterogeneous group of conditions that lead to joint signs and symptoms. Knee osteoarthritis is characterized by joint abrasion and irregular formation of new bone on the joint surface. This disease causes pain and limitations in carrying out daily activities and has severe socio-economic impacts (Fitriani, 2022).

According to Septiyani and Wijayanto, in sufferers of knee osteoarthritis there is a degenerative joint disorder due to inflammation of the knee joint which is characterized by progressive cartilage damage, the appearance of osteophytes, and changes in the synovial membrane. Several factors cause knee osteoarthritis, such as obesity, trauma or injury, weakness of the muscles and ligaments in the knee, and injury to the meniscus, resulting in pain, muscle weakness, and a decrease in functional activity (Septiyani & Wijianto, 2022). This is in accordance with this research, that as people get older, functional activity decreases in knee osteoarthritis sufferers, which results in sufferers being unable to carry out normal daily activities as usual.

This statement is supported by research conducted (Pramitha & Wahyudi, 2020) entitled "Ultrasound, TENS and Kinesiotaping Improve Functional Activity in Knee Osteoarthritis". This research uses a pre-experiment research design with pre and post test group design. The population in this study were knee osteoarthritis patients. Based on the researcher's inclusion criteria, there were 10 research subjects. Treatment 3x a week for 4 weeks. Functional activity assessment with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was carried out before and after 12x therapy sessions. The average functional activity before treatment was 52.1. The results obtained were that ultrasound, TENS, and kinesiotaping had an influence on increasing functional activity and reducing pain because TENS and ultrasound were able to reduce pain.

According to the researchers' assumptions, based on the results of research on respondents in hospitals who experienced knee osteoarthritis before TENS and Retrowalking intervention, the average functional activity was 54,790. Several factors influence the decline in functional activity in knee osteoarthritis, namely the presence of degenerative factors that cause synovial fluid to decrease with age, obesity and age differences, abnormal walking habits (antalgic gait). 10 out of 10 respondents experienced knee osteoarthritis because their body posture looked full. This means that obesity causes the knees to support the body when carrying out daily activities. As time goes on, synovial fluid decreases and this results in wear and tear on the knee joint, resulting in complaints of pain and muscle stiffness so that one cannot carry

out daily activities as usual.

Functional ability is defined as a person's ability to perform specific tasks related to daily activities. In osteoarthritis knee, pathology in the knee joint prevents a person from carrying out functional activities properly, such as getting up from sitting, squatting, standing, kneeling, walking up and down stairs, and other activities that burden the knee joint and require weight bearing.(Artika, 2020).

2. Average functional activity after administration of TENS and Retrowalking for Osteoarthritis Knee

Based on table 2, it shows that the average (mean) of the 10 respondents' functional activity after administering TENS and Retrowalking on Functional Activities in Osteoarthritis Knee is 31.520. The minimum functional activity value is 18.7 and the maximum is 41.6.

Variabel	N	Mean	Minimum	Maksimum
Posttest	10	31,520	18,7	41,6

TENS is a relatively cheap and safe non-pharmacological therapy. The pain modulating effects of TENS are aimed at peripheral components that can be regulated by central mechanisms. The inhibitory effects of TENS are based on the 'Gate Control Theory' of pain perception as described by Melzack and Wall (Ardyan et al., n.d.).

TENS is a physiotherapy modality that works using the gate control theory method, namely to reduce pain which will then increase the ability for functional activities and this method works by reducing pain in sufferers of knee osteoarthritis (Wahyu Palguna et al., 2018).

Retrowalking is one of the close kinematic chain exercises, where the retrowalking walking cycle starts from toe on of a limb to the next leg on the same body. When walking backwards it will reduce the compressive force from the patellofemoral joint which will have an impact on reducing articular cartilage trauma. (Wadhwa et al., 2016).

Retrowalking is very effective in reducing pain and improving physical function and balance in patients with knee osteoarthritis. Retrowalking or walking backwards has advantages compared to walking forwards, where walking backwards reduces the range of motion of the knee, helping to reduce the maximum vertical force and impulsive forces on the knee. So retrowalking can reduce pain through the activation mechanism of the hip extensor and flexor muscles, and when doing retrowalking or walking backwards the pressure that occurs on the patellofemoral joint is lower compared to walking forward so that by strengthening the hip extensor and flexor muscles you can compensate for the pain that occurs in knee (Yadav, 2016).

In line with previous research conducted (Susilawati et al., 2015) entitled "Closed Kinetic Chain Exercises are Better Than Open Kinetic Chain for Improving Functional Ability in Knee Osteoarthritis After Giving Micro Wave Diathermy (MWD) and Transcutaneous Electrical Nerve Stimulation (TENS)". The research design was true experimental (pre test &

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post test with control group design) with 12 treatments 3 times a week for four weeks. In the two groups, measurements were taken using WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index). The characteristics of the research subjects showed that the mean and SB characteristics of age, weight and height of the two treatment groups were not significantly different (homogeneous). Distribution of subjects according to gender of the entire sample in the categories of women (66.67%) and men (33.33%). Test the homogeneity of the data using Levene's Test. If the significance value is greater than 0.05 ($p > 0.05$) then the data is homogeneous. The Independent t-test shows that the t value = 2.748 and the p value = 0.021.

Furthermore, it was strengthened by previous researchers, namely (Rosadi et al., 2019) entitled "Comparison of the Effectiveness of Retrowalking and Quadriceps Strengthening Exercise on Increasing Daily Living Activities in Elderly People Affected by Osteoarthritis Knee". This research used a quasi-experiment using 31 samples using purposive sampling. The sample was divided into 2 intervention groups, namely the retrowalking group (n=15) and quadriceps strengthening (n=16). The data obtained was analyzed using the independent t-test, the data obtained was $t = 0.845$, meaning there was no difference in the effect of quadriceps strengthening exercise and retrowalking on increasing ADL.

According to the researchers' assumptions based on the results of research on osteoarthritis knee respondents after being given TENS and retrowalking interventions. Respondents said that after giving this intervention 8 times, the results showed an increase in functional activity with an average of 54.790 (moderate pain) with a standard deviation of 8.1779. Average functional activity after 31.520 (mild pain), standard deviation 7.1174, difference in average functional activity was 23.220. And the functional activity value after the intervention was that 10 respondents experienced mild pain (26-41.6).

After the intervention, overall respondents stated that there was an increase in functional activity compared to before the intervention was given and the symptoms felt by the patients were much lighter than before the intervention was given. This shows an indication of the influence of TENS and Retrowalking on functional activities in knee osteoarthritis.

3. Effect of TENS and Retrowalking on Functional Activities in Osteoarthritis Knee

Based on table 3, it is known that the difference in the average (mean) before and after 31,520 after 8 interventions with TENS and Retrowalking. There is an average difference of 23.270. Using the Paired Sample T-test, the $p\text{-value} = 0.000 < \alpha (0.05)$ so that H_0 is rejected. This means that there is an effect of giving TENS and Retrowalking.

	N	Mean	Std. Deviation	P-Value
Pre Test	10	54,790	8,0753	0,000
Post Test	10	31,520	7.1174	

TENS Is A Physiotherapy Modality That Works Using The Gate Control Theory Method, Namely To Reduce Pain Which Will Then Increase The Ability For Functional Activities And This Method Works By Reducing Pain In Sufferers Of Knee Osteoarthritis (Wahyu Palguna Et Al., 2018).

Retrowalking Is Very Effective In Reducing Pain And Improving Physical Function And Balance In Patients With Knee Osteoarthritis. Retrowalking Or Walking Backwards Has Advantages Compared To Walking Forwards, Where Walking Backwards Reduces The Range Of Motion Of The Knee, Helping To Reduce The Maximum Vertical Force And Impulsive Forces On The Knee. So Retrowalking Can Reduce Pain Through The Activation Mechanism Of The Hip Extensor And Flexor Muscles, And When Doing Retrowalking Or Walking Backwards The Pressure That Occurs On The Patellofemoral Joint Is Lower Compared To Walking Forward So That By Strengthening The Hip Extensor And Flexor Muscles You Can Compensate For The Pain That Occurs In Knee (Yadav, 2016).(Sunaringsih Et Al., 2021)

In Line With Previous Research Conducted (Susilawati Et Al., 2015) Entitled "Closed Kinetic Chain Exercises Are Better Than Open Kinetic Chain For Improving Functional Ability In Knee Osteoarthritis After Giving Micro Wave Diathermy (MWD) And Transcutaneous Electrical Nerve Stimulation (TENS)". The Research Design Is A True Experimental Pre Test & Post Test With Control Group Design, Each Sample From The Population Is Carried Out Using Purposive Sampling. The Sample Was Divided Into Two Groups With Each Group Consisting Of 6 Samples. Group One Received MWD, TENS, And Closed Kinetic Chain Training And Group Two Received MWD, TENS, And Open Kinetic Chain Training. Training Frequency 3 Times A Week For 4 Weeks. Significance Analysis Using The Paired T-Test Showed That Each Group Resulted In A Significant Increase In Knee Osteoarthritis Functional Ability After Different Treatments ($P < 0.05$), Which Means That Closed Kinetic Chain Training Can Improve Functional Activity In Knee Osteoarthritis More Than Open Kinetic Chain With The Same Modality.

In Line With Previous Research Conducted By (Septiyani & Wijianto, 2022) Entitled "Physiotherapy Program In Dextra Knee Osteoarthritis Cases: Case Report". This Research Uses A Case Report Method With A Patient Named Mrs. T Is 69 Years Old And Has Been Given Therapy 3 Times. The Results Of The Research Were A Decrease In Pain, An Increase In Joint Range Of Motion, An Increase In Muscle Strength, And An Increase In The Functional Ability Of Osteoarthritis Knee Sufferers.

In Line With Research (Rosadi Et Al., 2019) Entitled "Comparison Of The Effectiveness Of Retrowalking And Quadriceps Strengthening In Elderly People Affected By Knee Osteoarthritis". This Research Used A Quasi-Experimental Design, Involving 31 Respondents Using Purposive Sampling. The Sample Was Divided Into 2 Intervention Groups, Namely The Retrowalking Group ($N=15$) And Quadriceps Strengthening ($N=16$). The Data Obtained Was Analyzed Using The Independent T-Test, The T Value Obtained = 0.845, Which Means There Is No Difference In The Effect Of Quadriceps Strengthening And Retrowalking On Increasing ADL In Osteoarthritis Knee Patients.

According To The Researchers' Assumption, TENS And Retrowalking Can Increase Functional Activity Through The Purpose And Usefulness Of Each Exercise Given To Respondents Who Experience Knee Osteoarthritis. Patients With Osteoarthritis Knee, After

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Observations By Researchers, Found That There Were Degenerative Factors And Obesity That Caused Osteoarthritis Knee. On Average, Knee Osteoarthritis Sufferers Work As Housewives, Where Almost All Activities Are Carried Out At Home, Such As Walking, Going Up And Down Stairs, Squatting, Standing For Long Periods, Lifting Heavy Loads, And Other Activities That Require The Knees To Support The Body.

After The TENS And Retrowalking Intervention, There Was An Increase In Functional Activity Which Was Also Followed By A Decrease In The Pain Complained Of By Respondents. After The Intervention, Overall Respondents Looked More Relaxed And More Energetic. Respondents Also Said That After The Intervention Was Carried Out, Complaints Such As Not Being Able To Stand For A Long Time, Walking Long Distances, Squatting, Bending, Lifting Heavy Loads Became Lighter Than Before The Intervention.

Conclusion

Based on the results of research on the Effect of TENS and Retrowalking on Functional Activities in Osteoarthritis Knee in 2023. 1) The average functional activity in Osteoarthritis Knee before administering TENS and Retrowalking interventions was 54,790. 2) The average functional activity in Osteoarthritis Knee after TENS and Retrowalking intervention was 31,520. 3) The difference in functional activity in Osteoarthritis Knee after TENS and Retrowalking intervention is 23.270. It is known that the results obtained are $p\text{-value} = 0.000 < \alpha (0.05)$, meaning that H_0 is rejected. So it can be concluded that there is an influence of giving TENS and retrowalking on functional activities in osteoarthritis knee in 2023.

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