

THE EFFECT OF TENS AND ULTRASOUND DIATHERMY ON OSTEOARTHRITIS PATIENTS IN PHYSICAL MEDICINE AND REHABILITATION UNIT OF PATUT PATUH PATJU HOSPITAL, WEST NUSA TENGGARA**Irawan, Tannia Rizkyka, Muhayani, Gustin Fat' aah**

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Abstract

Osteoarthritis is generally recognized as a common musculoskeletal condition in Indonesia, characterized by the degeneration of joint cartilage and narrowing of the joint space. The form of therapy that can be given to knee OA patients is a combination of TENS therapy and ultrasound diathermy (USD). WOMAC is an index used to measure osteoarthritis patients based on pain, stiffness, and physical function. Patut Patuh Patju General Hospital is the only hospital in West Lombok district where physical medicine and medical rehabilitation have recently been introduced. This research aims to determine the effects of administering TENS and ultrasound diathermy on OA patients in the physical medicine and rehabilitation unit of Patut Patuh Patju Hospital, a newly established district hospital in NTB, which has been operational for the past year. This type of research uses a pre-experimental design with a one group pretest-posttest method. Sampling was taken using a purposive sampling technique with a total sample of 30. The research population was knee osteoarthritis patients undergoing physiotherapy treatment at the Medical Rehabilitation Unit of Patut Patuh Patju General Hospital. Data was collected using the WOMAC questionnaire before and after 6 until 8 times therapy. The distribution of research data was analyzed using the Shapiro-Wilk test. If the data distribution is normal, it is analyzed using the paired t-test, whereas if it is not normal, it is analyzed using the Wilcoxon test. The combination of TENS therapy and ultrasound diathermy results in improvement of WOMAC scores in knee osteoarthritis patients with p-value = 0.000 ($p < 0.05$).

Keywords: Osteoarthritis, TENS, Ultra-sound diathermy, WOMAC.

INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disorder that leads to joint dysfunction characterized by pain and limited range of motion, which in turn reduces physical activity and diminishes quality of life. This condition significantly contributes to the global burden of disease. Early diagnosis of knee OA is crucial for implementing effective treatments before the condition progresses to severe, irreversible stages (Allen, Thoma, & Golightly, 2022; Kanamoto et al., 2020) (TERZI & ALTIN, 2017).

Consequently, there has been a growing global focus on defining early OA and developing new treatment strategies (Allen et al., 2022; Kanamoto et al., 2020). The prevalence of OA can vary widely depending on factors such as age, sex, and geographical

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location within a country (Allen et al., 2022; Kanamoto et al., 2020). The number of OA cases in 2019 increased by 153.12% in males and 143.36% in females compared to 1990. This represents more than a doubling of OA cases in both sexes over the same period. The rising incidence of OA in Indonesia mirrors global trends but at a higher rate, with a 147.44% increase in Indonesia compared to a 113.25% global increase from 1990 to 2019 (Jiang, 2022).

The pathogenesis of worsening osteoarthritis is complex and involves several factors, with key elements including chondrocyte regulation within the extracellular matrix, genetic influences, local mechanical factors, and inflammation. Joint degeneration leading to the clinical syndrome of osteoarthritis most commonly occurs in the knee, hip, hands, feet, and spine (Butarbutar, Basuki, Sungono, Riantho, & Fidiarianto, 2024).

Of the 344 million people living with osteoarthritis, a significant proportion experience moderate to severe severity levels requiring rehabilitation. With an aging population and rising rates of obesity and injuries, the prevalence of osteoarthritis is expected to continue increasing globally (Butarbutar et al., 2024; Holden et al., 2023).

Prevalence of Joint Diseases Based on RISKESDAS 2018, West Nusa Tenggara Province, generally NTB province has a prevalence of 5.03%, with West Lombok at 6.42%. The majority are females (62%), with the highest prevalence observed among farmers and fishermen at 7-7.4% (Holden et al., 2023).

Damage to the structure of the knee and its manifestations causes a person with knee osteoarthritis to experience difficulty in carrying out daily activities, which may have an impact on their quality of life (Holden et al., 2023).

The Western Ontario and McMaster Osteoarthritis Index (WOMAC) is a widely used disease-specific questionnaire designed for patients with knee and hip arthritis. It was originally developed to assess clinically significant, patient-relevant changes in health status and to evaluate therapeutic outcomes following interventions (Laporan Nasional Riskesdas 2018, 2020).

Based on the considerations and the absence of prior research on osteoarthritis in NTB in general and specifically in Lombok Barat, the author intends to conduct a study about the physical medicine and rehabilitation approach on osteoarthritis. This research also aims to assess the The Effect of TENS and Ultrasound Diathermy on Osteoarthritis Patients in Physical Medicine and Rehabilitation Unit of Patut Patuh Patju Hospital, West Nusa Tenggara.

RESEARCH METHOD

This type of research uses a pre-experimental design with a one group pretest-posttest method (Seltman, 2012). Sampling was taken using a purposive sampling technique with a total sample of 30. The research population was knee osteoarthritis patients undergoing physiotherapy treatment at the Medical Rehabilitation Unit of Patut Patuh Patju General Hospital (Leardi, 2009). Data was collected using the WOMAC questionnaire before, after 6 until 8 times therapy.

Inclusion Criteria

1. Patients with knee osteoarthritis (OA) in the Medical Rehabilitation Clinic confirmed by Orthopedic Specialist and Physical Medicine and Rehabilitation Specialist.
2. Respondents who have undergone therapy ≤ 3 times.
3. Have OA grade 1, 2, or 3 based on radiological examination using the Kellgren-Lawrence classification system.

4. Respondents willing to participate and have signed the consent form.

Exclusion Criteria

1. Received physiotherapy treatment within the last 1 month prior to the study (washout period).
2. History of intra-articular injection therapy or total knee arthroplasty.
3. Have neurological disorders such as paralysis or stroke.

RESULT AND DISCUSSION

Table 1 Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Before	47.5667	30	2.31462	.42259
After	23.6333	30	4.06400	.74198

On the table above, the observed difference shows a decrease in the mean WOMAC score from 47.5 before treatment to 23.63 after treatment. The significance value of $0.000 < 0.05$ indicate that the null hypothesis (H_0) is rejected.

ANOVA was used to determine whether there were significant differences among the three treatments, followed by post hoc tests to identify which treatment had the most impact on WOMAC. The significance value of $0.000 < 0.05$ indicates that there are differences among the three treatments. Subsequent post hoc tests were performed to determine which treatment had the most influence after treatment.

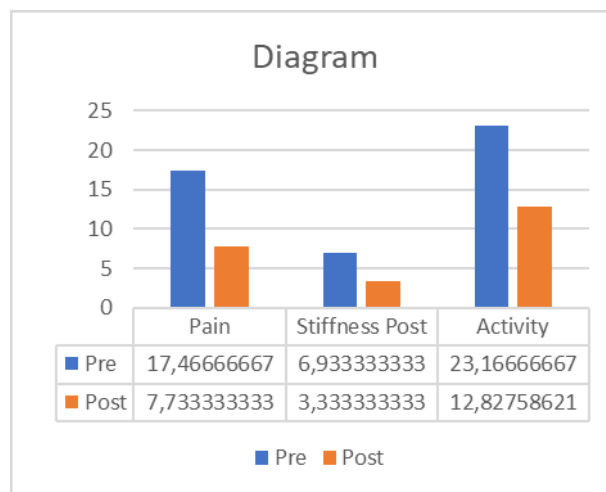


Figure 2. Diagram Pre-and Post-Treatment

From the table above, it is evident that there is a difference in the mean data between pre- and post-treatment. Based on the data obtained before and after treatment, it is apparent that improvement in physical activity is one of the factors where the majority of patients experienced changes, as reflected in the improvement of WOMAC scores after treatment (Wu, Zhu, Chen, & Zhang, 2022).

Based on the data analysis using the Wilcoxon test on the difference in WOMAC scores before (T1) and after 6-8 therapy sessions (T2), it can be concluded that there is an effect of the combination therapy of TENS and diathermy on improving WOMAC scores in knee osteoarthritis patients after 6-8 therapy sessions.

Table 2 Characteristic samples.

Sex	Male	0
	Female	30
Age	30-40	1
	41-50	7
	41-60	13
	61-70	9
BMI	Underweight	0
	Normal	2
	Overweight	14
	Obese I	11
	Obese II	3
Occupation	Housewives	10
	Market seller	6
	Retired	5
	Farmer	9
Kallgren-lawrence	I	1
	II	13
	III	16

Based on the sample characteristics, all respondents were female (100%), with the largest age group being 41-60 years old (43%). Overweight BMI accounted for 46%, and the most common occupations were housewives and farmers at 30%. The majority of respondents had severe OA based on radiological findings, with 53% classified as grade 3 or higher (Ha, Lee, Hong, & Lee, 2021).

Transcutaneous Electrical Nerve Stimulation (TENS) is one of the alternative therapies used to alleviate chronic pain in osteoarthritis. Electric current generated by this device stimulates nerves through the skin. Antidromic TENS stimulation can block the transmission of stimuli from nociceptors to the spinal cord. TENS also activates the autonomic nervous system, triggering vasomotor responses that subsequently alter tissue chemistry to reduce pain (Shalhoub et al., 2022).

Diathermy is also widely used in managing various musculoskeletal issues, including osteoarthritis. It raises tissue temperature, which can induce vasodilation, increase cellular activity, raise pain thresholds, and reduce muscle spasms (Shalhoub et al., 2022).

The physical medicine and rehabilitation service in West Lombok was established in 2022 and has received positive reception from residents in the region. The introduction of TENS and ultrasound diathermy is a new experience for some osteoarthritis (OA) patients in West Lombok. The use of TENS and diathermy is commonly employed to alleviate pain and stiffness in OA patients, as evidenced by research conducted by Shimoura et al., 2020, they conducted a Randomized Control Trial involving 50 patients with mild osteoarthritis (Kallgren-Lawrence grade 0 or 1) in Japan. They observed improvements in VAS scores, Time Up and Go test, and 6-minute walk test (6MWT) in the group receiving TENS compared to the placebo group (Ab Rahman, Narhari, Sharifudin, & Shokri, 2020)

Wu et al, 2021, conducted a systematic review and meta-analysis on twenty-nine studies on MEDLINE, PubMed, and Cochrane. They found (1398 people, age range 54-85, 74% are female) and conclude that TENS could significantly relieve pain, decrease dysfunction and improve walking ability in people with Knee OA, but it is not effective for stiffness (Mintarjo, Poerwanto, & Tedyanto, 2023)

Sin Ho et al., 2021 conducted a study to investigate selective region high-frequency diathermy on pain, function, balance and gait in older patients with degenerative knee osteoarthritis (DKO) (Iijima et al., 2020). The results of this study suggest that selective region high-frequency diathermy at trigger points with therapeutic exercises is an effective intervention to decrease pain, improve knee function, balance and gait in patients with DKO. The selective region high-frequency diathermy with therapeutic exercises may be feasible and provide potential benefits for rehabilitation of DKO (Iijima et al., 2020).

Therefore, the combination therapy of TENS and diathermy can improve WOMAC scores in patients with knee osteoarthritis. WOMAC scores encompass pain, stiffness, and functional activity components. A lower WOMAC score indicates a reduction in the complaints experienced by the patient due to osteoarthritis.

CONCLUSION

It is concluded that there is a significant difference in the mean WOMAC scores before and after therapy, or there is a significant treatment effect on WOMAC scores. When compared between groups, the factor of physical activity is the aspect where patients experienced more improvement compared to other WOMAC points

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