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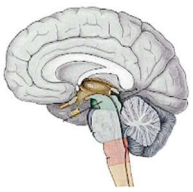

EFFECT OF ULTRASOUND THERAPY AND MUSCLE ENERGY TECHNIQUE ON CHANGING THE ROM IN THE CASE GENU OSTEOARTHRITIS AT IMMANUEL HOSPITAL BANDUNG

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ABSTRACT

Osteoarthritis is a chronic condition that develops slowly, characterized by weakening and wear of the cartilage itself and the formation of new bone on the joint surfaces. In cases of knee osteoarthritis, the clinical diagnosis is generally made in individuals aged 45 years and over or in older people who experience pain in the knee area related to activity and stiffness in the knee joint. The aim of this study was to evaluate the impact of providing Ultrasound Therapy and Muscle Energy Technique on changes in Range of Motion (ROM) in cases of Osteoarthritis Genu at the medical rehabilitation clinic at Immanuel Hospital Bandung.This research uses a quasi-experimental design with the design used is One-Group Pretest-Posttest. This study used 20 Osteorthritis Genu patients, using the Shapiro Wilk Test normality test method and using Paired Sample T-test analysis. Based on the research results, it can be concluded: 1. The average ROM value before being given Ultrasound Therapy and Muscle Energy Technique was 120, with a minimum value of 110 and a maximum value of 128 and a standard deviation value of 4.42. 2. The average ROM value after being given Ultrasound Therapy and Muscle Energy Technique was 123.05, with a minimum value of 113 and a maximum value of 132 and a standard deviation value of 4.39. 3. There is an effect of giving Ultrasound Therapy and Muscle Energy Technique on changes in ROM values, it can be shown that the significance value of the Paired sample t-test is 0.000.

INTRODUCTION

Osteoarthritis (OA) stands as the prevailing type of arthritis and presents a significant association with various comorbidities. It is a persistent and degenerative ailment marked by pain and deterioration of joint cartilage. OA is a gradual, chronic condition distinguished by weakening, particularly in the elderly or individuals aged 45 and above, accompanied by pain during activities in the knee region and stiffness in the knee joints. The characteristic features include the erosion of cartilage and the development of new bone on the joint surface (Pramana Putra et al., 2022).

Osteoarthritis Genu commonly has a higher prevalence in women compared to men, ranging from 10-15% in individuals aged 35-45 years to 35-45% in those aged 65 (DAŞKAPAN et al., 2013). The knee joint is most frequently affected by osteoarthritis. Studies have indicated a decrease in muscle strength and function among individuals with this condition, and the functional implications of knee osteoarthritis are linked to a reduction in the mobility of the lower extremities. The quadriceps femoris muscle's functionality may

diminish, leading to balance issues that impact the mobility and function of individuals with knee osteoarthritis.

Osteoarthritis can be categorized into two types: primary osteoarthritis and secondary osteoarthritis. (Anggraini and Hendrati, 2014). Primary osteoarthritis, referred to as idiopathic osteoarthritis, is a manifestation of osteoarthritis that lacks a identifiable cause and isn't linked to any systemic ailment or local alterations in the joints. Nevertheless, numerous individuals commonly associate this form of osteoarthritis with the aging process. On the other hand, secondary osteoarthritis is a variant resulting from other ailments or conditions, including post-traumatic incidents, congenital and growth abnormalities, bone and joint disorders, maladies induced by calcium deposits, endocrine and metabolic issues, inflammatory diseases, and additional risk factors such as obesity..

As of 2004, the World Health Organization (WHO) reported that osteoarthritis affected 151 million individuals globally, with 24 million of them in Southeast Asia aged 18 and above. In Indonesia, the overall prevalence of osteoarthritis was 34.3 million people in 2002, which increased to 36.5 million people by 2007. Approximately 40% of individuals over the age of 70 are estimated to be afflicted by osteoarthritis, and 80% of those with osteoarthritis encounter mild to severe issues with mobility. This high prevalence contributes to a decline in the quality of life. (Hendrik and Awal, 2018).

Ultrasound involves acoustic vibrations of high frequency that fall beyond the audible range for the human ear. Employing ultrasound in the context of Osteoarthritis Genu is intended to enhance blood circulation, expediting the healing process of inflammation. This is facilitated by the presence of numerous beneficial nutrients in the blood, contributing to accelerated wound healing and subsequently alleviating pain (Sekti and Prasetyo, 2021).

Muscle Energy Technique is a method for relaxing muscles that entails isometric contraction prior to stretching, effectively preventing additional tissue damage. The approach to Muscle Energy Technique revolves around enhancing the strength of the patient's muscles, subsequently inducing relaxation and stretching of both agonist and antagonist muscles. Research findings suggest that Muscle Energy Technique is notably efficacious in improving joint range of motion (Nambi et al., 2013), The concept underlying Muscle Energy Technique is to execute manipulations in a gentle manner. Muscle Energy Technique can be categorized into two types: isometric Muscle Energy Technique and isotonic Muscle Energy Technique. (Khuman et al., 2014).

The primary objective of employing Ultrasound Therapy and Muscle Energy Technique in the context of Osteoarthritis is to alleviate pain, preserve joint integrity, enhance functionality, and diminish deformity and instability of the knee joint. Active approaches, such as isometric contraction movements involving the knee muscles, have demonstrated effectiveness in pain relief and mitigating restrictions in joint movement. This, in turn, enhances the overall quality of life and boosts functional activity in patients. Engaging in exercises that enhance muscle strength and joint mobility typically demands a significant and sustained commitment from patients over an extended period. However, its efficacy is well-established, as previous research indicates that such exercises have a modest to moderate impact on pain. The overarching goal is to increase quadriceps muscle strength, thereby alleviating pain, preserving joint integrity, promoting functional activity, and reducing deformity and instability in the joint. (DAŞKAPAN et al., 2013).

METHODS

In carrying out research, researchers use methods quantitative research and quasi-experimental research. The research design used by researchers is One-Group Pretest-Posttest Design. In the One-Group Pretest Posttest Design the dependent variable is measured into one pretest and posttest group, a treatment plan is given.

Table 1. *One Group Pretest Posttest Design*

Subject	*Pretest*	Intervention	*Posttest*
S	P1	I	P2

Description:

S : Subject

P1 : Observation before administering the combined Muscle Energy Technique and Ultrasound intervention

P2 : Observation after administering the combined Muscle Energy Technique and Ultrasound intervention

I : Providing a combination of Muscle Energy Technique and intervention Ultrasound

The sample is part of a set of characteristics possessed by the research population (Sugiyono, 2018). Sampling in this research was carried out using a purposive sampling technique, namely a sampling technique with certain criteria. The sample in this study consisted of around 20 respondents who met the inclusion and exclusion criteria.

RESULTS AND DISCUSSION

Table 2. Age and Gender Characteristics

Characteristics	Frequency	Percentage
Gender		
Man	5	25%
Woman	15	75%
Total	20	100%
Age		
40-51	7	35%
51-60	9	45%
61-70	4	20%
Total	20	100%

Referring to Table 2, it can be observed that 25% of the participants are male, while 75% are female. Furthermore, the age distribution reveals that the majority of respondents, up to 45%, fall within the age range of 51-60 years, with a minimum of 20% of respondents aged 61-70 years.

Table 3. Normality test

	Shapiro-Wilk		
	Statistic	df	Sig.
Pretest	0.941	20	0.251
Postest	0.963	20	0.609

Examining the outcomes of the normality test as illustrated in Table 3, it is evident that both pretest and posttest data exhibit p values of 0.251 and 0.609, respectively. With $p > 0.05$, this indicates that the data follows a normal distribution.

Table 4. Paired Sample T-test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 Pretest - Postest	-3.050	1.538	.344	-3.770	-2.330	-8.868	19	.000

Based on table 4, it is known that the sig. (2-tailed) of $0.000 < 0.05$, then it can be concluded that there is an impact increase in ROM between Pretest and Posttest values.

Administering Ultrasound serves the purpose of alleviating pain, involving a continuous application of 1-2w/cm (on nerve fibers) for 3-5 minutes and 0.5-1w/cm (on nerve roots and ganglia) for 3-4 minutes, implemented over a 15-minute duration in each treatment session, occurring 5 times every 2-3 days (Arif et al., 2021). The application of ultrasound to injured tissue involves the vasodilation of blood vessels, leading to an elevated quantity of antibodies that facilitate the repair of damaged tissue. Ultrasound induces a biological effect, enhancing blood circulation and concurrently mitigating inflammation, culminating in a reduction of pain (Arif et al., 2021). Ultrasound induces both thermal and non-thermal effects. The thermal effect results in a rise in skin surface temperature, promoting increased blood circulation, alleviation of mild inflammation, pain relief, and enhanced joint mobility.

The implementation of the Muscle Energy Technique involves utilizing the patient's muscles, followed by relaxing and stretching both agonist and antagonist muscles. The primary goal is to strengthen or enhance the tone of weak muscles, alleviate hypertonicity, stretch muscles and fascial tension, and enhance the functionality of the musculoskeletal system. Additionally, it aims to mobilize joints with restricted mobility, improve local blood circulation, and alleviate pain (Arthawan et al., 2018).

According to research by Hariharasudhan and Balamurugan (2018), The amalgamation of Ultrasound Therapy and Muscle Energy Technique is anticipated to have a significant impact on expediting tissue healing, releasing adhesions, alleviating pain, enhancing tissue elasticity and flexibility, achieving maximal muscle elongation, and improving joint range of motion. Consequently, this combined approach is expected to be effective in reducing disability associated with Osteoarthritis Genu. Furthermore, the synergy of Muscle Energy Technique with Ultrasound presents a novel therapeutic combination that yields a more positive impact in Osteoarthritis Genu treatment. This combination operates directly on trigger points, accelerates tissue repair by stimulating the physiological inflammatory process, releases adhesions, alleviates pain, diminishes spasms, enhances muscle flexibility, augments range of motion, and ultimately contributes to increased functional ability.

CONCLUSIONS AND RECOMMENDATIONS

Based on a sample of 20 patients at Immanuel Hospital Bandung, the findings of this study suggest that there is an impact on the alteration of Range of Motion (ROM) in individuals with Osteoarthritis Genu through the application of Ultrasound Therapy and Muscle Energy Technique.

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