



Combination Effects of Microwave Diathermy and Mulligan Bent Leg: Raise Technique on Myogenic Low Back Pain

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Abstract

Myogenic Low Back Pain, commonly known as lower back pain, is caused by the muscles receiving repeated static loads which cause pain, lower back muscle spasms and limited lumbosacral mobility resulting in decreased functional activity. This research is a pre-experiment with a one group pretest-posttest design, aimed at finding out the effect of a combination of Microwave Diathermy and Mulligan Bent Leg Raise Technique on increasing the functional ability of Myogenic Low Back Pain. This research was carried out at the Physiotherapy Polyclinic at RSUD dr. La Palaloi Maros with a sample of 14 people. Results: Based on the Wilcoxon test analysis, $p = 0.001$ ($p < 0.05$), which means that microwave diathermy and Mulligan bent leg raise technique interventions can significantly increase functional activity in myogenic low back pain patients. Providing microwave diathermy and mulligan bent leg raise technique can have a significant effect on increasing functional ability in sufferers of myogenic low back pain.

Keywords: Low Back Pain, Microwave diathermy, Mulligan Bent Leg Raise Technique

Introduction

Low Back Pain (LBP) is the world's most frequently encountered health problem. Back pain is the musculoskeletal pain that people complain about the most. Back pain does not cause death, but individuals who experience it become unproductive. Myogenic LBP occurs due to muscle contractions in the lower back area due to repeated muscle tension (Hidayat, 2018). Myogenic LBP is also referred to as a disorder of the muscles in the lower back area and its surroundings which is caused by disorders or abnormalities in the musculoskeletal elements

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without being accompanied by neurological disorders between the 12 thoracic vertebrae and below the hips or anus. Myogenic LBP has a prevalence rate that varies between 7.7% to 38%. LBP problems in workers generally start at the age of 45-60 years in the young adult category and according to slight gender differences (Juniantari et al, 2018).

Based on the results of initial observations that the author found on the land during the last 3 months, there were 40 visits with a total of 15 patients. Most of the complaints experienced are pain in the lumbar area, lower back muscle spasm, and limited lumbosacral mobility, causing a decrease in functional activity.

Efforts that can be made to treat LBP cases in general are by carrying out physiotherapy on the patient. Choosing the right therapeutic modality is a must for a physiotherapist, in this study the author used the Microwave Diathermy and Mulligan Bent Leg Raise Technique modalities.

The use of MWD has physiological effects and therapeutic effects. These physiological effects include changes in temperature, connective tissue, muscle tissue, nerve tissue. Meanwhile, the therapeutic effect is more towards soft tissue, tissue contracture and conductivity disorders. The heat effect produced by MWD apart from reducing pain, MWD also provides relaxation to the muscles so that it can reduce muscle spasms, because the blood relaxes and supplies O₂ to the painful area smoothly. Once the muscle spasms are reduced, it will be easier to carry out the movements in the exercise therapy that will be carried out. The MWD modality can produce a local reaction in the tissue which will increase sphincter vasomotion, resulting in local homeostasis and ultimately local vasodilation in the tendon and improved metabolism (Cameron, 2017).

Based on the description of the problem above, the formulation of this research problem is "Is there an effect of the combination of Microwave Diathermy and Mulligan Bent Leg Raise Technique on increasing the functional ability of Myogenic Low Back Pain?" and the aim of this research is to determine the effect of the combination of Microwave Diathermy and Mulligan Bent Leg Raise Technique.

Literature Review

Previous research by Javeed et.al (2018) entitled "Chronic Low Back Pain and Treatment with Microwave Diathermy" showed that microwave diathermy really helps improve symptoms and reduce pain in chronic low back pain patients.

Based on the results of another study by Qudus et al (2018) entitled "The Effect of Microwave Diathermy Therapy on Pain in Myogenic LBP Patients at the Rancaekek Occupational Health Hospital" explains that changes in temperature can reduce pain through secondary stimulation of afferent nerves thereby affecting inhibition of motor neurons and will reduces muscle spasm and in the last five years, patients with lower back pain have increased by 59% (Wheeler et al., 2018) and the older a person is, the more likely they are to experience a decrease in bone flexibility which will cause symptoms of lower back pain (Andini, 2015).

Research Method

Procedure and Methods

Types of research

This research uses a pre-experimental method with a one group pretest-posttest research design. The research was carried out twice, namely observations before the experiment (O1) called pre-test, and observations after the experiment (O2) called post-test with one sample group. The pre-test and post-test were carried out using an observation sheet.

Population and Sample

The population of this study were patients suffering from myogenic low back pain who underwent physiotherapy at RSUD dr. La Palaloi Maros. The study population was patients treated with microwave diathermy intervention and the Mulligan bent leg raise technique. The sample in this study were sufferers of myogenic low back pain who had functional limitations based on the inclusion criteria in sampling. The sampling technique in this research is purposive sampling. The inclusion criteria in this study were myogenic low back pain sufferers with an ODI score $\geq 21\%$ ($>$ moderate disability), myogenic low back pain patients who had functional disorders, willing to be research respondents until completion. The exclusion criteria in this study were sufferers of myogenic low back pain who had a history of cancer, a history of fractures and osteoporosis, neurological disorders and were uncooperative or unresponsive.

Data Collection Procedures

The pre and post tests carried out were the Modified Oswestry Low Back Pain Disability Questionnaire which aims to measure the patient's functional abilities, the test procedures are:

The instrument used was the Modified Oswestry Low Back Pain Disability Questionnaire. The implementation procedure is to explain to the patient that this test is to measure the patient's perceived functional activity, then show the questionnaire and explain how to fill it out. Patients fill out the 10-question Modified Oswestry Low Back Pain Disability Questionnaire based on the patient's perceived functional activities. The results obtained are recorded in a blank.

Intervention Procedures

The treatment group was given Microwave Diathermy and Mulligan Bent Leg Raise Technique. Microwave Diathermy is applied to the lower back. The dose used is a distance of 5-10 cm, continuous MWD, 2 times per week with a total of 8 interventions, intensity 24-50 W depending on patient tolerance, time 10 minutes. Meanwhile, the mulligan bent leg raise technique is an isometric contraction-relaxation-stretching exercise by passively placing the hips and knees in a flexed position. The dose used is 8 repetitions of passive movements with 3 sets, the number of interventions is 8 times.

Research Hypothesis

There is an effect of the combination of microwave diathermy and mulligan bent leg raise technique in increasing the functional ability of myogenic low back pain.

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Data analysis

Data describing sample characteristics based on age and gender were analyzed using descriptive statistics. Data hypothesis testing shows ordinal data and paired sample groups, so a non-parametric statistical test is used, namely the Wilcoxon test.

Results and Discussion

Table 1. Average lumbar functional changes based on pre, post and difference values

Data	Average	Standard Deviation
Pre Test	31,00	7,636
Post Test	17,86	7,502
Difference	13,14	4,348

Based on the table above, the average score for the pre test is 31.00, the post test is 17.86 and the difference is 13.14. This shows that the administration of Microwave Diathermy and Mulligan Bent Leg Raise Technique can result in an increase in functional activity in myogenic low back pain patients with an average increase of 13.14.

Tabel 2. Wilcoxon Signed Ranks Test

Post Test – Pre Test	Rerata	Z	P
	7,50	-3,310	0,001

Based on the table above, the Wilcoxon test results were obtained, namely $p = 0.001$ ($p < 0.05$), which means that the Microwave Diathermy and Mulligan Bent Leg Raise Technique interventions can significantly increase functional activity in myogenic low back pain patients. Myogenic low back pain is pain felt in the lower back area which is a disorder of the skeletal muscles caused by the muscles receiving repeated static loads which causes complaints in the joints, ligaments and tendons which most often occurs in work activities characterized by muscle spasms, as well as limitations in functional activities (Pratama, 2019).

Microwave Diathermy is a treatment using a fission stressor in the form of electromagnetic energy produced by alternating current frequency 2450 MHz with a wavelength of 12.255 cm, which has the effect of increasing local tissue vasodilation so that it can transport algogenic substances which are irritants (sensory level), increasing tissue repair, and increasing cell metabolism through nocisensory normalization, thereby causing a decrease in irritation of muscle metabolic waste and reducing the perception of pain in sufferers of low back pain. Myogenic also produces a thermal effect on tissue by increasing circulation in the skin, subcutaneous tissue and muscles as well as increasing extensibility in soft tissue. (Cameron, 2017). Giving Mc Kenzie Exercises provides a stretching effect on shortened tissue structures, reduces muscle spasm and reduces pain (Herdiana et al., 2022).

Giving Mulligan Bent Leg Raise Technique after giving MWD can cause isometric muscle contractions which can also activate the pumping action mechanism. With this mechanism, metabolic and acetabolic waste can be transported smoothly and the buildup of lactic acid in the muscles can be reduced so that pain can be reduced and disability can be reduced. The Mulligan Bent Leg Raise method also causes autogenic inhibition which will stimulate the Golgi tendon organs of the muscles, thus producing a relaxing effect on muscles that are experiencing tension. Mulligan bent leg raises are also able to make muscles elastic and mobilize the vertebral joints and stretch the lumbodorsal muscles, thereby reducing limitations and increasing functional abilities (Phansopkar et al, 2014). Ultrasound administration reduces pain by a combination of thermal effects, such as the absorption of sound waves, which increase blood flow, and non-thermal effects, such as cavitation and microflow, which accelerate cell healing (Sardianti, 2022). Namnaqani et al (2019) stated that Mc Kenzie is effective in reducing pain in sufferers of lower back pain.

Mulligan Bent Leg Raise Technique is performed to increase hamstring and rectus femoris extensibility and improve range of motion, muscle length and pain felt in the hip and lumbar region. The success of this technique is characterized by the absence of pain while the practitioner performs the technique to move and improve function (Wayne et al., (2020).

This was proven in this study where after giving the Mulligan Bent Leg Raise Technique and MWD it had a significant effect in the form of increasing functional activity in myogenic low back pain patients.

The research results are also supported by Prianthara et al (2017) entitled "Mulligan Bent Leg Raise Increases the Range of Motion of the Lumbosacral Joint and Reduces Disability Compared to Slump Stretching in Tile Craftsmen with Mechanical Low Back Pain in Darmasaba Village" proving that Mulligan Bent Leg Raise causes posterior pelvic tilt which can improve the biomechanical function of the spine and pelvic so that lumbopelvic movement is not disturbed so that the range of motion of the joints increases. This research is also in line with research conducted by Wibawa et al (2018) which reported that there was a decrease in functional pain scores of 12.86 (SB 2.797) in sufferers of low back pain after administering ultrasound and Mc. Kenzie exercises.

Conclusion

The average value of functional ability before administering Microwave Diathermy and Mulligan Bent Leg Raise Technique to sufferers of myogenic low back pain is in the moderate disability category. The average value of functional ability after administering Microwave Diathermy and Mulligan Bent Leg Raise Technique to sufferers of myogenic low back pain is from the moderate disability to minimal disability category. The combination of Microwave Diathermy and Mulligan Bent Leg Raise Technique can have a significant influence on increasing functional ability in sufferers of myogenic low back pain.

Declaration of conflicting interest

The authors declare that there is no conflict of interest in this work.

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