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Effect of Infra-Red and Muscle Energy Technique on Pain and Range of Motion on Low Back Pain

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Abstract

Low back pain includes a spectrum of different types of pain (e.g., nociceptive, neuropathic and nosiplastic, or nonspecific) that often overlap. The elements that comprise the lumbar spine (e.g., soft tissues, vertebrae, zygapophyseal and sacroiliac joints, intervertebral discs, and neurovascular structures) are susceptible to different stressors, and each, alone or in combination, can cause Low back pain. Low back pain can be treated by physiotherapy. One of the physiotherapy modalities that can be used to treat the problem of low back hand pain is infra red.Infrared is combined with the Muscle Energy technique to overcome pain and functional disorders due to low back pain. The Muscle Energy Technique is a class of osteopathic soft tissue (initial) manipulation methods that incorporate as well as directed and controlled, the patient begins with isometric and/or isotonic contractions, designed to improve musculoskeletal function and reduce pain.This study aims to determine the effect of infrared and muscle energy technique on pain and range of motion in low back pain. This research is a quasy experiment research with a pretest posttest one group design approach. This research was carried out in June-August 2024 at the Mabbulo Sibatang Clinic, Makassar City, Indonesia.The results of this study show that there is an influence of Infra-red combined with Muscle Energy technique in overcoming pain to increase flexibility in low back pain.

***Keywords*:** Infra-Red; Low Back Pain.

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1. Introduction

Low back pain (LBP) includes a spectrum of different types of pain (e.g., nociceptive, neuropathic and nonspecific) that often overlap. The elements that comprise the lumbar spine (e.g., soft tissues, vertebrae, zygapophyseal and sacroiliac joints, intervertebral discs, and neurovascular structures) are susceptible to different stressors, and each, alone or in combination, can cause Low back pain [1]. Low back pain is the leading cause of disability worldwide [2]. According to Corp non-pharmacological therapies are recommended for the treatment of low back pain throughout Europe [3]. Low back pain can be overcome with physiotherapy management. Some cases of LBP can be treated with a variety of physiotherapy interventions based on the problematics found. Pain due to muscle spasms can be overcome with muscle energy techniques. The muscle energy technique can reduce pain through the effect of muscle relaxation. Various modalities and physiotherapy techniques can be given in the case of low back pain sufferers, one of the manual therapy techniques is muscle energy technique and with Infra Red electrotherapy [4]. MET can affect the reduction of pain through stretching in muscles that are spasm or shortened so that tissue relaxation and stretching of muscle tissue are obtained, through maximum contraction then followed by relaxation and followed by stretching of agonist muscles, which will activate the golgi tendon of the organ, where there is a release of intermyofibrillar fascia adhesion and pumping action on the remaining lymph and venous fluid, so that venosus return and lymph drainage increase which will then increase Vascular tissue so that tissue elasticity increases and pain can be reduced [4]. The advantages of MET are that it can reduce pain, overcome muscle spasm, and overcome limitations in the range of motion of the joint. The disadvantage of MET itself is that it is not recommended for people with pathological diseases such as osteoporosis, arthritis, etc. Infrared (IR) or thermal radiation is an energy band in the complete electromagnetic spectrum. IR is radiation with a wavelength longer than the red end of the visible spectrum and extends to the microwave region, i.e. from 760 nm to 1 mm [5]. Infrared is used for the purpose of reducing pain, reducing muscle spasms [5].

Several previous studies have reported that Infrared can reduce pain [6,7], MET can also reduce pain in people with low back pain [8,9]. This previous study reinforces the premise that the combination of Infrared with MET can be an effective intervention for managing low back pain.

2. Material and Method

2.1. Description of the Study Area

The study was conducted at Mabbulo Sibatang Clinic, Makassar, Indonesia in June to August 2024.

The intervention provided was in the form of infrared with the application of muscle energy technique in patients with low back pain.

2.2. Population and Sample

This study is a pre-experimental study with a single-group pretest-posttest design. The researcher gave a pre-test of pain and range of motion to 30 respondents who would be given treatment. The researchers then provided

therapy in the form of infrared and muscle energy techniques. After treatment, the researcher gave a post-test of pain and range of motion.

2.3. Collecting Data and Procedure Intervention

The data collection procedure was carried out in several stages. First, an initial test (pre-test) was conducted to assess pain levels and range of motion (ROM) in 30 respondents diagnosed with low back pain. These assessments served as baseline data before treatment. The intervention involved applying infrared therapy using a specially designed six-lamp infrared device alongside Muscle Energy Technique (MET). The treatment was administered twice a week for four weeks. After completing the intervention, a final test (post-test) was conducted to measure pain levels and ROM again, enabling a comparison to evaluate the effectiveness of the treatments.

2.4. Ethical consideration and clearance

Ethical approval for this study was obtained from The Ethics Committee, Health Polytechnics of Makassar, Department of Physiotherapy, Makassar, Indonesia.

3. Result

This study uses a type of quasi-experimental research using a pre-test post-test one-group design. This research was conducted in June – August 2024 in Makassar. Pain levels and range of motion (ROM) were measured before and after the intervention. The intervention was administered twice a week for four weeks. In the final session, post-test measurements were conducted to evaluate the changes in pain levels and ROM.

Table 1: Respondents by gender

Gender		**n**	**%**
a.	Man	5	16,7
b.	Woman	25	83,3
Total		30	100,0

Table 1. shows that the distribution of respondents by gender, more women than men.

Table 2: Data Normality Test

Saphiro-Wilk	n	α
Pre test pain score	30	0,001
Post test pain score	30	0,023
Pre-test flexibility score	30	0,625
Post test flexibility score	30	0,075

Table 2 shows the value of α =0.001 (<0.05), for the pre test and 0.023 (<0.05) for the pre post test, which means that the data is not distributed normally, so it is continued with a non-parametric test (Wilcoxon test). For flexibility, it shows a value of α =0.625 (>0.05), for the pre test and 0.075 (>0.05) for the pre post test, which means that the data is distributed normally, so it is continued with a non-parametric test (paired t-test).

Table 3: Pain and range of motion pre test and post test intervention with infrared and MET

score	n	Mean	SD	p-value
Pre test pain	30	4,47	1,137	0,000*
Post test pain	30	2,53	1,383	
Pain difference	30	1,93	0,740	
Range of motion pre test	30	4,49	2,015	0,000**
Range of motion post test	30	6,20	1,616	
Range of motion difference	30	1,70	0,357	

Description: * Wilcoxon test; ** Paired t test

Based on table 3, it can be explained that the administration of infrared and MET obtained a pretest pain value of 4.47 (scale 0-10, smaller is better) and post test of 2.53 (scale 0-10, smaller is better). This shows a significant reduction in pain. The results of the Wilcoxon test obtained a value of p = 0.000<0.05. This means that the administration of infrared and MET has a significant effect on pain in low back pain. For flexibility, the pre-test score was 4.49 (bigger is better) and the post test was 6.20 (bigger is better) which showed a significant increase in flexibility. The results of the Wilcoxon test obtained a value of p = 0.000<0.05. This means that the application of infrared and MET has a significant effect on flexibility in low back pain.

4. Discussion

The results of the study showed that there was an effect of infrared and muscle energy techniques on pain due to low back pain. The average pain intensity in low back pain before infrared and muscle energy technique was 4.47, while the average pain intensity in low back pain after infrared and muscle energy technique was 2.53. This shows that the administration of infrared and muscle energy techniques reduces pain due to low back pain by 1.93.

Infrared and Muscle Energy Technique (MET) are an effective combination to reduce pain due to low back pain. Infrared works by utilizing the heat generated from infrared rays, which penetrate deep tissues such as muscles and ligaments. This therapy helps to increase blood flow in the affected area, bringing more oxygen and nutrients, thereby speeding up healing and reducing inflammation. In addition, the heat from infrared relaxes tense muscles and exerts an analgesic effect by blocking pain signals to the brain, thus reducing pain perception. On the other hand, the Muscle Energy Technique (MET) is a manual therapy technique in which the patient actively uses his muscles against the resistance provided by the therapist. MET works by improving muscle balance, reducing muscle tension, and increasing range of motion (ROM). By reducing muscle spasms and

improving joint mobility, MET helps reduce the pressure on the spinal structures that cause low back pain, resulting in less pain and improved body function. The combination of these two therapies not only relieves pain but also improves the healing and recovery process of the patient.

Infrared uses heat waves to improve blood circulation and reduce muscle spasm. Research shows that infrared can reduce pain by increasing tissue metabolism and causing vasodilation, which helps reduce muscle tension and pain. In addition, the heat effect of infrared also causes vasodilation of blood vessels and increases circulation in tissues and causes metabolism to increase so that pain is reduced [10].

Muscle Energy Technique is a collection of manual therapy techniques that are designed to enhance muscle function and alleviate discomfort by means of controlled contractions. Research suggests that MET can effectively reduce the intensity of pain in patients with LBP. The mechanism of MET is predicated on post-isometric relaxation, in which muscle contractions activate receptors that suppress excessive motor neuron activity, resulting in improved circulation to the affected area and muscle relaxation [11].

This research is in line with several studies that state that the combination of these two methods can provide the maximum effect in improving and reducing pain [10]. One study found that an infrared intervention combined with MET resulted in a more significant reduction in pain compared to other methods such as infrared combined with contract-relax stretching [10].

This research is in line with Ayu et.al's research which stated that combination of Infra Red (IR) with Muscle Energy Technique (MET) significantly reduces pain in patients with myogenic low back pain. The results of the paired sample t-test showed a significant decrease in pain scores after the intervention, which means that the combination of Infra Red (IR) with Muscle Energy Technique (MET) is effective in managing low back pain due to muscle problems [12].

This research is in line with Tang et.al's research which stated that muscle energy technique and microwave diathermy are effective in reducing pain levels in patients with low back pain [8]. This research is also in line with the research of Halimah and his colleagues. stated that infrared combined with William flexion is effective in reducing pain and increasing lumbar flexibility in patients with low back pain [9].

5. Limitation of Study

Limitations of this study include small sample size, subjectivity of pain measurement, variation in individual responses, and difficulty in controlling for external variables such as daily activity. The short duration of therapy limits evaluation of long-term effects, and the lack of a strong control group reduces the clarity of intervention results. In addition, aspects of patient function and quality of life were under-reported.

6. Conclusion

Based on the results of the study, it can be concluded that there is an effect of infrared and muscle energy technique on the reduction of pain in low back pain. There was an effect of infrared and muscle energy

technique on increasing range of motion in low back pain.

7. Abbreviation

MET: Muscle Energy Technique; ROM: Range of Motion; LBP: Low Back Pain

8. Competing interest

The authors declare that they have no competing interest

References

[1] N. N. Knezevic, K. D. Candido, J. W. Vlaeyen, J. V Zundert, and S. P. Cohen, "Low back pain: Epidemiology, mechanisms, and treatment.," in *Lancet-Seminar Series*, 2021.

[2] K. Mescouto, R. E. Olson, P. W. Hodges, and J. Setchell, "A critical review of the biopsychosocial model of low back pain care: time for a new approach?," *Disabil Rehabil*, vol. 44, no. 13, pp. 3270–3284, 2022.

[3] N. Corp *et al.*, "Evidence-based treatment recommendations for neck and low back pain across Europe: a systematic review of guidelines," *European Journal of Pain*, vol. 25, no. 2, pp. 275–295, 2021.

[4] L. Chaitow and J. DeLany, *Clinical application of neuromuscular techniques, Volume 2 E-Book: The lower body*. Elsevier Health Sciences, 2013.

[5] V. Robertson, A. Ward, J. Low, A. Reed, and D. MCSP, *Electrotherapy explained: principles and practice*. Elsevier Health Sciences, 2006.

[6] G. D. Gale, P. J. Rothbart, and Y. Li, "Infrared Therapy for Chronic Low Back Pain: A Randomized, Controlled Trial," *Pain Res Manag*, vol. 11, no. 3, pp. 193–196, Jan. 2006, doi: 10.1155/2006/876920.

[7] V. Endaryanti, W. Israwan, A. Zakaria, and F. X. Hargiani, "Pengaruh Infra Red Terhadap Penurunan Skala Nyeri Pada Pasien Low Back Pain Myogenic Di Rumah Sakit Khusus Bedah Hasta Husada Kepanjen Malang," *Ju rnal K eperawatan Mu hammadiyah*, vol. 7, no. 1, pp. 27–31, 2022.

[8] A. Tang, M. Thahir, and H. Hasbiah, "Muscle Energy Technique dan Micro Wave Diathermy untuk Menurunkan Nyeri pada Low Back Pain," *Jurnal Penelitian Kesehatan" SUARA FORIKES"(Journal of Health Research" Forikes Voice")*, pp. 223–225, 2022.

[9] N. Halimah and A. Pradita, "Effectiveness of Infrared and William Flexion Exercise on

Reducing Pain and Increasing Flexibility in Patients with Low Back Pain," *Babali Nursing Research*, vol. 4, no. 3, pp. 401–411, 2023.

[10] M. A. P. Arthawan, N. Wahyuni, and I. G. A. Artini, "The Comparison Of Muscle Energy Technique And Infrared Intervention With Contract-Relax Stretching And Infrared In Improving Range Of Motion Neck Joint On Online Game Players With Myofascial Pain Sindrome Upper Trapezius Muscle In Denpasar," *Jurnal Harian Regional*, 2018.

[11] G. K. Santos *et al.*, "Effectiveness of muscle energy technique in patients with nonspecific low back pain: a systematic review with meta-analysis," *Eur J Phys Rehabil Med*, vol. 58, no. 6, Jan. 2023, doi: 10.23736/S1973-9087.22.07424-X.

[12] N. P. O. D. Ayu, N. L. N. Andayani, and S. Purnawati, "he Intervention Infrared And Muscle Energy Technique As Well As Infrared And Passive Stretching To Decrease Functional Painful Of Low Back Pain Myogenic Condition," *Majalah Ilmiah Fisioterapi Indonesia*, vol. 6, no. 3, p. 25, Sep. 2018, doi: 10.24843/MIFI.2018.v06.i03.p07.