

What is the effectiveness of the combination of massage therapy and heat therapy on joint range of motion? Experimental study in patients with shoulder pain ¿Cuál es la eficacia de la combinación de masoterapia y terapia de calor en la amplitud de movimiento articular? Estudio experimental en pacientes con dolor de hombro

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Abstract. This study aims to evaluate the effectiveness of a combination of massage therapy and heat therapy on improving joint range of motion in patients with shoulder pain. Shoulder pain is often accompanied by limited range of motion, which can affect daily activities and quality of life. Massage therapy is known to relieve muscle tension and improve blood circulation, while heat therapy has the effect of reducing muscle stiffness and increasing tissue elasticity. The combination of these two therapies is expected to provide synergistic benefits in overcoming shoulder pain problems and improving joint range of motion. This research method is pre-experimental with a one group pretest and posttest design approach. The study involved giving a combination of masage therapy and heat therapy regularly to a group of patients with shoulder pain. Joint range of motion was evaluated before and after the intervention using a pretest-posttest design. Statistical analysis, including t-test and significance test, was used to assess the difference between the mean pretest and posttest. The results showed a significant increase in the mean posttest compared to the pretest. The results of the significance test also showed that the effect that occurred was significant ($0.001 < 0.05$), indicating the effectiveness of the combination of massage therapy and heat therapy in increasing joint range of motion in patients with shoulder pain. These findings provide strong support for the implementation of a combination of massage therapy and heat therapy as an effective approach in shoulder pain rehabilitation by improving joint range of motion limitations. This study contributes to the scientific understanding of the synergistic benefits of both therapies and provides a basis for the development of improved treatment guidelines for individuals with similar conditions.

Keywords: Massage therapy, heat therapy, joint range of motion, shoulder pain.

Resumen. Este estudio pretende evaluar la eficacia de una combinación de terapia de masaje y terapia de calor en la mejora de la amplitud de movimiento articular en pacientes con dolor de hombro. El dolor de hombro suele ir acompañado de una limitación de la amplitud de movimiento, que puede afectar a las actividades cotidianas y a la calidad de vida. Se sabe que la terapia de masaje alivia la tensión muscular y mejora la circulación sanguínea, mientras que la terapia de calor tiene el efecto de reducir la rigidez muscular y aumentar la elasticidad de los tejidos. Se espera que la combinación de estas dos terapias proporcione beneficios sinérgicos para superar los problemas de dolor de hombro y mejorar la amplitud de movimiento articular. Este método de investigación es preexperimental con un enfoque de diseño pretest y posttest de un grupo. El estudio consistió en administrar regularmente una combinación de masoterapia y terapia de calor a un grupo de pacientes con dolor de hombro. Se evaluó la amplitud de movimiento articular antes y después de la intervención mediante un diseño pretest-posttest. Se utilizó un análisis estadístico, que incluía una prueba t y una prueba de significación, para evaluar la diferencia entre las medias pretest y posttest. Los resultados mostraron un aumento significativo de la media posttest en comparación con la pretest. Los resultados de la prueba de significación también mostraron que el efecto que se produjo fue significativo ($0,001 < 0,05$), lo que indica la eficacia de la combinación de la terapia de masaje y la terapia de calor en el aumento de la amplitud articular de movimiento en pacientes con dolor de hombro. Estos hallazgos proporcionan un fuerte apoyo para la aplicación de una combinación de terapia de masaje y terapia de calor como un enfoque eficaz en la rehabilitación del dolor de hombro mediante la mejora de la amplitud articular de las limitaciones de movimiento. Este estudio contribuye a la comprensión científica de los beneficios sinérgicos de ambas terapias y proporciona una base para el desarrollo de directrices de tratamiento mejoradas para individuos con afecciones similares.

Palabras clave: Masoterapia, termoterapia, amplitud de movimiento articular, dolor de hombro.

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Introduction

Physical activity, which is considered the most important aspect of people's lives (Hardinata et al., 2023; Suryadi, Komaini, Suganda, et al., 2024; Suryadi, Nasrulloh, Haryanto, et al., 2024; Suryadi, Susanto, Faridah, et al., 2024), physical activity is a crucial element for physical growth and development, both in children and in older age groups (Mashud et al., 2024; Suryadi et al., 2024). Several research studies have indicated that engaging in physical activities, particularly through

sports, exerts a positive influence on overall fitness (Rubiyatno et al., 2023; Suryadi et al., 2023). This participation is known to contribute to physical, psychological, and emotional well-being (Hughes et al., 2020), while concurrently diminishing the likelihood of developing diseases (Meo et al., 2021; Sumantri et al., 2023). However, it is crucial to acknowledge that excessive training may elevate the risk of sports-related injuries (Andersson et al., 2018; Mahesvi et al., 2023). Injuries, especially to the upper extremities such as shoulder pain. Sports and physical activity can cause injury or

strain to muscles and joints, often resulting in shoulder pain, often posing diagnostic and therapeutic challenges (Li et al., 2021). Shoulder pain itself has a high prevalence and is a common musculoskeletal disorder addressed by physiotherapists (Elkhadir, 2016). The high incidence of shoulder injuries, especially in high-intensity and physical contact sports such as handball, judo and court tennis, points to the need for understanding and effective treatment of this problem (Cirino & Colvin, 2022; de Oliveira et al., 2017; Fares et al., 2020).

Individuals suffering from shoulder pain frequently encounter constraints in their joint range of motion, leading to adverse effects on their daily functioning and overall quality of life. In response to this concern, various treatment methods, such as massage therapy and heat therapy, have been suggested. The objective of this study is to assess the efficacy of combining massage therapy and heat therapy in enhancing the joint range of motion among patients grappling with shoulder pain. In this context, massage therapy has been recognized as an effective method to relieve muscle tension, improve blood circulation, and facilitate recovery (Liza et al., 2023; Moyer et al., 2004). In addition, heat therapy has been recognized to reduce muscle stiffness, increase tissue elasticity, and relieve pain (Markov, 2007). The combination of the two is expected to provide greater synergistic benefits.

Previous research has shown that the combination of massage therapy with ultramagnetic therapy can improve flexibility and joint range of motion (Liza et al., 2022). Similarly, heat therapy is also known to have a relaxing effect on muscles and improve joint mobility (Lubrano et al., 2023; Markov, 2007). However, there has been no specific research that delves into the impact of combining massage therapy and heat therapy on the joint range of motion in individuals suffering from shoulder pain. In contrast, other studies have demonstrated that incorporating intermittent exercise with sports massage therapy led to further enhancements in standing long jump and sit-up performance, as well as improvements in blood pressure, BMI, self-confidence, and a reduction in suicidal tendencies (Shen et al., 2021).

Given the importance of understanding effective treatment methods, this study seeks to provide valuable insights into the efficacy of using both massage therapy and heat therapy together to improve joint range of motion in individuals experiencing shoulder pain. While previous research has explored the use of heat and cold therapy in treating musculoskeletal injuries (Malanga et al., 2015), this study aims to expand upon these findings by focusing specifically on individuals with shoulder pain and limited joint mobility. The results of this research can potentially lay the groundwork for developing more effective and personalized treatment protocols for individuals struggling with shoulder pain and restricted range of motion.

Methods

Participants

The population in this study were patients of DILAKS: Sport Massage Therapist, in the last 2 months who experienced shoulder pain injury. In this study, purposive sampling was used with the consideration that patients with shoulder pain, willing to be correspondents, and experiencing decreased function of movement. Therefore, the number of samples obtained was 15 people consisting of 11 men and 4 women who were given treatment. The data acquired reveals a captivating spectrum of ages amongst the individuals participating in this investigation, encompassing a span extending from the tender age of 17 to the ripe age of 35.

Procedure

This study adopts a pre-experimental design utilizing a one-group pretest and posttest approach. The initial phase involved conducting a pretest to establish baseline data regarding the range of motion in the joints of individuals experiencing shoulder pain. Subsequently, the researcher gathered and analyzed the data obtained from the pretest, which served as the baseline measurement. The intervention, comprising massage therapy and heat therapy, was then administered to the participants twice a week for a duration of three weeks. Following the treatment period, a final measurement (Posttest) was conducted. Next, to define the aspects that can determine the outcome during the intervention. These elements are: (1) application of heat and massage 2 times a week. (2) The location of the heat and massage application on the muscle. (3) The massage technique used sports injury massage. (4) The number of professionals who applied the combination therapy amounted to 3 therapists. (5) A total of 3 evaluators used the goniometer.

The goniometer served as the primary instrument for measuring the range of joint motion (ROM) among individuals with shoulder pain. The flexion and abduction movements were assessed based on the range of motion. The ROM data were collected on two occasions, once before the initiation of the combined massage therapy and heat therapy, and again after the completion of the treatment sessions. The ROM assessment can be seen in Figure 1.

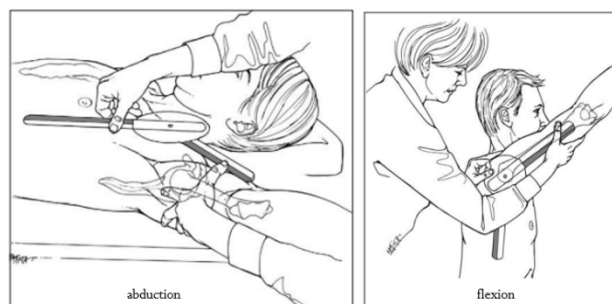


Figure 1. Assessment of ROM using Gineometer

Data Analysis

The research data underwent descriptive analysis in order to furnish a synopsis of the research data and to expedite the exposition of the research data. Data that followed a normal distribution were subjected to scrutiny utilizing the t test to ascertain the mean disparity between pretest and posttest outcomes as well as the statistical significance. The software employed for these analyses was SPSS 26.

Results

The table contains two tests: Kolmogorov-Smirnov and Shapiro-Wilk. The tests were performed on four different ranges of motion (ROM): Abduction Pretest, Abduction Posttest, Flexion Pretest, and Flexion Posttest. The results showed that for some ranges of motion, the data did not follow a normal distribution (Sig. <0.05). So this information is important to assess the validity of statistical tests so that they will continue using nonparametric tests. The results can be seen in table 1.

The highlighted text in table 2 presents the results of a study on the effectiveness of combined massage and heat therapy on joint range of motion in patients with shoulder pain. The abduction test section shows that there are no negative ratings and no ties in the test. The positive rating is 15 degrees, with an average rating of 8.00 and a total rating of 120.00. Furthermore, the flexion test section also showed no negative ratings and no ties. The positive rating was 15 degrees, with an average rating of 8.00 and a total rating of 120.00. The combination of massage therapy and heat therapy is effective in increasing joint range of motion in patients with shoulder pain, as shown by the positive ratings on both tests.

The Wilcoxon test data reveals the outcomes of a study investigating the effectiveness of combining massage therapy and heat therapy on the joint range of motion in individuals experiencing shoulder pain. A negative "z" value indicates a decline in the range of motion following the therapy. Furthermore, the findings demonstrate a statistically significant impact of the therapy on the range of motion, with a significance level of 0.001. From these findings, it can be deduced that the combined approach of massage therapy and heat therapy significantly reduces the abduction and flexion range of motion in patients with shoulder pain. The results can be seen in table 3.

Table 1. Normality Test Results

ROM	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Abduction Pretest	0.280	15	0.003	0.787	15	0.003
Abduction Posttest	0.202	15	0.100	0.889	15	0.064
Flexion Pretest	0.198	15	0.116	0.881	15	0.049
Flexion Posttest	0.247	15	0.014	0.803	15	0.004

Table 2. Wilcoxon Signed Ranks Test

Result	ROM	N	Mean Rank	Sum of Ranks
Abduction Posttest - Abduction Pretest	Negative Ranks	0 ^a	0.00	0.00
	Positive Ranks	15 ^b	8.00	120.00
	Ties	0 ^c		
	Total	15		
Flexion Posttest - Flexion Pretest	Negative Ranks	0 ^d	0.00	0.00
	Positive Ranks	15 ^e	8.00	120.00
	Ties	0 ^f		
	Total	15		

Table 3. Wilcoxon Effect Test Results

ROM Result	Abduction Posttest – Abduction Pretest	Flexion Posttest – Flexion Pretest
Z	-3.409 ^b	-3.412 ^b
Asymp. Sig. (2-tailed)	0.001	0.001

Table 4. Descriptive Results of Flexion and Abduction ROM

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Abduction Pretest	15	48	121	169	140.80	18.865
Abduction Posttest	15	30	150	180	169.60	9.891
Flexion Pretest	15	47	121	168	142.80	17.486
Flexion Posttest	15	20	160	180	171.33	8.616

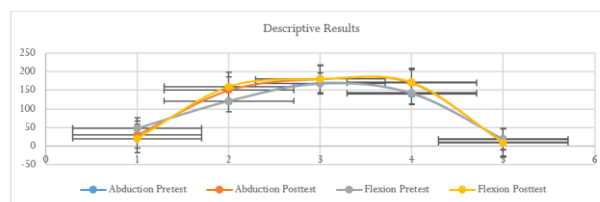


Figure 2. Descriptive Results of ROM in Shoulder Pain Patients

Derived from the aforementioned data, an enhancement in the range of motion (ROM) is evident, specifically in flexion and abduction subsequent to the implementation of a combined massage therapy and heat therapy. The post-test values exhibit a mean abduction movement of 169.60 and a mean flexion movement of 171.33. Detailed results are presented in Table 4 and illustrated in Figure 2.

Discussion

The primary objective of this writing is to demonstrate the effectiveness of the combined approach of massage therapy and heat therapy in the rehabilitation of shoulder pain. The outcomes indicate that the integration of these two therapies leads to an increase in both mean posttest and pretest values in the range of motion of joints affected by shoulder pain. The t-test results reveal a calculated value surpassing the t-table, and the significance test underscores the substantial impact of

the therapy, signifying that regular application of the combined massage therapy and heat therapy significantly enhances shoulder pain conditions and increases joint range of motion.

These findings establish a robust foundation for advocating the incorporation of a combination of massage therapy and heat therapy into shoulder pain rehabilitation programs. Other studies in the field also assert that the simultaneous use of massage therapy and ultramagnetic therapy produces a noteworthy effect in alleviating shoulder pain and ameliorating joint range of motion (Liza et al., 2022). Similarly, a study noted that traditional Thai massage (TTM) administered over a four-week period can effectively reduce pain intensity, increase pain threshold, and enhance cervical flexion as well as left lateral flexion (Areeudomwong et al., 2022).

Furthermore, prior research has highlighted that massage therapy plays a positive role in restoring joints to their normal positions following the creation of space through pulling or traction, without encountering friction between the joints. Consequently, this aids in the restoration of normal joint range of motion and alleviates stiffness (Mahesvi et al., 2023). Hence, the application of massage therapy and heat therapy has proven to be beneficial for overall body recovery post-injury. Not in all contexts this application may be the most appropriate, as well as not in all post-injury phases, especially in the most acute ones. Additionally, the positive impact of massage therapy extends to stress reduction and favorable outcomes for various conditions, including premature infants, skin ailments, and pain syndromes such as arthritis and fibromyalgia (Field, 2016, 2019b, 2019a).

Positive effects of massage therapy are also observed in the realm of athletic sports, as evidenced by research (Guo et al., 2021). Moreover, studies suggest that massage therapy can induce adaptive changes in the somatosensory cortex, contributing to injury recovery and peripheral nerve repair (Xing et al., 2021). These collective findings underscore the crucial role of massage therapy in the post-injury recovery process. Additionally, preemptive premedication with gabapentinoids emerges as a strategy that enhances the quality of postoperative rehabilitation, especially in laparoscopic cholecystectomy, by mitigating postoperative shoulder pain, reducing PONV incidence, and improving sleep quality on the first postoperative night (Nakhli et al., 2018).

In the context of shoulder injuries in youth tennis players, consistency in providing training loads may have the benefit of reducing shoulder injury complaints, so evaluation and treatment is required. (Cirino & Colvin, 2022). Therefore, the need for shoulder injury prevention strategies is of particular concern, especially early in a player's career (Liaghat et al., 2021). Based on these findings, this study proposes the combination of massage therapy and heat therapy as an approach that can be effectively implemented in shoulder pain rehabilitation. Although this study provides a picture of renewal in overcoming injuries to the shoulder, this study also

has limitations, namely in Shoulder Adduction and Extension which also need to be checked during ROM checks. In addition, the number of samples is also something that needs to be considered.

Conclusion

Drawing conclusions from the findings of this research, it can be affirmed that the amalgamation of massage therapy and heat therapy plays a beneficial role in enhancing the joint range of motion among individuals grappling with shoulder pain. It is a common occurrence for patients experiencing shoulder pain to encounter constraints in their range of motion, potentially impeding their day-to-day activities and overall quality of life. Massage therapy, with its expertise in relieving muscle tension and improving blood circulation, synergizes with the effects of heat therapy which can reduce muscle stiffness and improve tissue elasticity. This study showed that the combination of the two therapies provided additional benefits in improving joint range of motion compared to the use of either massage therapy or heat therapy separately. This can be attributed to the synergistic effect of both therapies working in tandem to relieve muscle tension, improve blood circulation, and provide a significant relaxing effect on the area affected by shoulder pain. This study provides scientific support for the use of a combination of massage therapy and heat therapy as an effective approach in the management of shoulder pain and improvement of joint range of motion. These results can serve as a foundation for the development of more specific treatment recommendations for individuals with shoulder pain conditions who have limited range of motion. In addition, it is important to consider individual characteristics and the severity of their condition in designing an optimal treatment plan. Although these results show positive effectiveness, keep in mind that each treatment should be personalized according to the needs and characteristics of each patient. Therefore, consultation with a healthcare professional before implementing this combination therapy is recommended. These conclusions may form the basis for further research and the development of more comprehensive treatment guidelines in shoulder pain management.

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