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Effectiveness of Reciprocal Inhibition and Post-Isometric Relaxation Technique in the Management of Upper Trapezitis

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ABSTRACT

BACKGROUND: Upper trapezitis, marked by pain and tightness in the upper trapezius muscle, is a frequent musculoskeletal issue typically linked to poor posture, overuse, and stress. Post-isometric relaxation (PIR) and reciprocal inhibition (RI) are well-known therapies used for relieving pain and tension in the muscles. Combining these techniques may offer synergistic benefits in managing upper trapezitis, but the evidence supporting their effectiveness remains unclear.

Methods: The study involved a total of 90 participants, with 45 individuals in each of the two groups. Group A consisted of 45 subjects who received the Reciprocal Inhibition (RI) technique, while Group B comprised 45 subjects who underwent the Post-Isometric Relaxation (PIR) technique. Male and female participants, aged 20 to 40 years, were chosen according to the inclusion criteria. They were clinically diagnosed with upper trapezitis, assessed using the NDI scale and a pressure algometer as outcome measures.

Results: PIR group had significant improvement with a mean (21.93) in reducing the pain and mean (16.60) in improving the functional ability of neck in people with upper trapezitis with a p-value <0.0001.

CONCLUSION: Among people with upper trapezitis, the Post-Isometric Relaxation treatment regimen has shown greater effectiveness in reducing discomfort and improving functional outcomes.

KEYWORDS: common musculoskeletal, post-isometric relaxation, reciprocal inhibition, ultrasound, upper trapezitis.

INTRODUCTION

Muscle spasms and inflammation in the upper trapezius muscle, which is situated at the rear of the neck and shoulders, are symptoms of upper trapezitis. The thoracic and upper cervical regions contain the big, superficial muscle known as the trapezius. It attaches to the medial third of the superior nuchal line and the scapular spine after beginning at the external occipital protuberance and the spinous processes of vertebrae C7 through T12.

The Muscle Energy Technique (MET) utilizes specific, controlled, patient-initiated contractions, both isometric and isotonic, aimed at enhancing musculoskeletal function and alleviating pain. With this active method, the patient contracts their muscles voluntarily and under control while facing resistance from the therapist (5). MET is a "hands-on" therapy that encourages muscular stretching, relaxation, and strengthening. It is an alternate kind of treatment for general neck discomfort with the goal of reducing pain and regaining appropriate joint mobility (6).

Reciprocal inhibition (RI) and post-isometric relaxation (PIR) are two physiological phenomena that are used in MET to treat musculoskeletal problems, including pain, muscle spasm, and weakness (7). Reciprocal inhibition, commonly employed in physical therapy, chiropractic care, and sports medicine, capitalizes on the principle that contracting one muscle group automatically suppresses its opposing muscle group, facilitating smooth movement. Therapists utilize manual pressure or targeted exercises to activate agonist muscles while simultaneously inhibiting antagonists, promoting balanced muscle function and coordinated movement. This technique, integrated into rehabilitation programs for muscle imbalances, joint issues, and movement limitations, aids in enhancing flexibility, easing muscle tension, improving joint mobility, and reinstating optimal movement patterns (8). Post-isometric relaxation (PIR) is frequently utilized in physiotherapy to enhance muscle flexibility and alleviate discomfort. This technique entails administering passive

stretching to a muscle after an isometric contraction. In PIR, the individual engages the specific muscle against resistance offered by the therapist briefly, after which a period of relaxation ensues. During this phase, the therapist carefully applies a controlled stretch to the muscle (9). Two hypotheses exist. The first contends that isometric muscle activation releases the constricted joint. According to the second concept, which is the gamma gain of the muscle spindle is reset when the muscle contracts. Right now, it's difficult to say which theory is true(10).

The Neck Disability Index questionnaires and pressure algometer are study outcomes. A popular self-assessment technique for determining how neck discomfort impairs a person's capacity to perform daily duties and function normally is the Neck Disability Index (NDI)(13). It consists of ten questions that cover a range of topics related to disability caused by neck pain, including the degree of pain, carrying out personal tasks, lifting things, reading, getting headaches, focusing, driving, sleeping, and engaging in leisure activities. Every question is scored on a 5-point rating system, with higher scores denoting more severe disabilities (14).

Using a pressure algometer, the strength the trapezius muscle is finally evaluated. When compared to force plate readings, the algometer under investigation showed good metrics of validity and reliability (15).

Although there are many treatment alternatives, not much is known regarding how well manual therapy techniques like reciprocal inhibition (RI) and post-isometric relaxation (PIR) work in conjunction with ultrasonic therapy. In order to treat upper trapezitis, this study intends to explore the possible synergistic effects of RI and PIR.

MATERIALS AND METHODS:

This study will take place at Saveetha Medical College and Hospital. A total of 90 participants were involved, with 45 individuals in each of the two groups. Group A included participants who underwent the Reciprocal Inhibition Technique (RIT) (n=45), while Group B received the Post-Isometric Relaxation Technique (PIRT) (n=45). Selection was based on inclusion criteria, with participants ranging from 20 to 40 years old, and both males and females were included. All participants were clinically diagnosed with upper trapezitis using outcome measures such as the NDI scale and a pressure algometer.

The study was carried out for 4 weeks, 3 in a week on alternative days. Where both the groups underwent ultrasound for 10 minutes at 3 MHZ frequency to reduce the inflammation and proceeded with the following the techniques.

Sample size

Ninety individuals with upper trapezitis, aged 20 to 40, comprising both males and females, make up the sample size. The reciprocal inhibition approach was applied to one set of these individuals, while post-isometric relaxation was administered to the other.

Participants:

The sample size is estimated assuming 90 subjects with upper trapiszitis, aged between 20-40 years. Through Convenient sampling technique both males and females were included with the NPRS the value ranges from 4-8.

PROCEDURE:

The study, carried out at Saveetha Medical College and Hospital, included 90 participants who were evenly split into two groups of 45. Group A was treated with the Reciprocal Inhibition Technique (RIT), while Group B received the Post-Isometric Relaxation Technique (PIRT). Participants, both male and female, aged 20 to 40 years, were selected according to the inclusion criteria and were clinically diagnosed with upper trapezitis using outcome measures such as the NDI scale, goniometer, and pressure algometer. The study spanned 4 weeks, with treatments administered three times per week on alternate days. Both groups first received a 10-minute ultrasound session at a 3 MHz frequency to reduce inflammation, followed by the respective techniques.

Group A (reciprocal inhibition technique)

The patient will be supported appropriately and sat pleasantly. The therapist will grasp the ear/mastoid region on the same side with one hand while stabilising the shoulder on the affected side with the other. Before flexing and rotating towards the afflicted side, the patient will be instructed to side-bend their head and neck towards the opposing side. The patient will be positioned by the therapist in the upper trapezius right before they reach the restriction barrier. After that, the patient will be told to apply 20% of their maximum force on the afflicted side of their shoulder while the therapist resists. After five seconds of maintaining this isometric contraction, the upper trapezius will be stretched for ten to sixty seconds.

Group B (Post isometric relaxation technique)

Once the ultrasound therapy was completed, the Post-Isometric Relaxation (PIR) technique was performed on the upper trapezius fibers. As the therapist stabilised the shoulder with one hand and the ipsilateral mastoid process with the other, the patient's head and neck were flexed and side-bent away from the treated side until they were just short of the limitation barrier. The patient was told to inhale and hold their breath for seven seconds while simultaneously moving the ear towards the shoulder and lifting the stabilised shoulder towards the ear, producing resistance on both sides. They were then told to release their breath, unwind for three seconds, and then have their shoulders extended downward for thirty seconds.

OUTCOME MEASURES:

Neck Disability Index (NDI): A popular tool for evaluating disability in people with neck issues is the Neck Disability Index (NDI). It includes six items about everyday tasks like lifting, working, driving, playing, taking care of oneself, and reading, as well as four items about subjective symptoms like pain severity, headaches, attention, and sleep quality. Each of the ten items is rated on a scale from 0 to 5. The scoring system is categorized as follows: scores between 0 and 4 indicate no disability, 5 to 14 signify mild disability, 15 to 24 denote moderate disability, 25 to 34 indicate severe disability, and scores above 34 represent complete disability. The maximum possible score is 50, and only participants with an NDI score ranging from 15 to 24 will be included in the study.

Pressure algometer: Pressure pain thresholds, which indicate the point at which pain is first perceived, are recorded at specific locations during the assessment. This data helps evaluate pain sensitivity, monitor changes over time, and guide treatment strategies for musculoskeletal problems affecting the upper trapezius muscle. A pressure algometer is used by the evaluator to apply gradually increasing pressure to designated areas on the upper trapezius. The pressure is applied perpendicularly to the skin's surface and is increased incrementally in a controlled manner.

DATA ANALYSIS

A pressure algometer and the Neck Disability Index (NDI) were used to measure pain and functional activity prior to the intervention. The results of the pre-test were compared to the post-test values that were acquired four weeks into the intervention. The Paired t-test was used for comparisons within the same group, while the Independent t-test was used for comparisons across groups. After then, the information was arranged in tables for analysis.

RESULT

The results indicate that both groups experienced significant improvements in pain reduction and neck functional ability. However, the PIR group showed greater improvement, with a mean pain reduction of 21.93 and a mean improvement in functional ability of 16.60. In comparison, the RI group had a mean pain reduction of 21.16 and a mean functional improvement of 17.89. The p-value for these findings was less than 0.0001, highlighting the statistical significance in people with upper trapezitis.

DISCUSSION

The purpose of this study was to evaluate the effects of post-isometric relaxation (PIR) and reciprocal inhibition (RI) strategies on pain management and functional performance in patients with upper trapezitis. Comparing these two manual therapy methods provides important insights into their effectiveness and underlying mechanisms. The findings showed that for people with upper trapezitis, the PIR approach was superior to RI in terms of reducing pain intensity and improving functional outcomes. These results suggest that the two approaches may have different therapeutic philosophies and workings, which could result in varying degrees of efficacy.

The PIR technique's better results in this study are consistent with earlier studies showing how well it works to improve cervical range of motion, lessen discomfort, and enhance quality of life for patients with non-specific neck pain and trapezitis. However, it is important to recognize that other studies have also reported favorable results using muscle energy techniques (MET), which include both RI and PIR, for treating a range of musculoskeletal issues.

While this study offers valuable insights into the comparative effectiveness of RI and PIR for treating upper trapezitis, further research is necessary to better understand their underlying mechanisms and to provide stronger evidence for the clinical use of these techniques in managing specific musculoskeletal disorders.

It is important to interpret the findings of this study within the context of its limitations, such as the sample size, treatment duration, and potential confounding variables. Additionally, individual patient characteristics and preferences should be taken into account when choosing the most suitable treatment approach.

This research contributes to the existing knowledge by directly comparing the effectiveness of two manual therapy techniques in the management of upper trapezitis, providing important insights for clinical decision-making and enhancing treatment approaches for this condition.

The findings of this study are consistent with those of Senthilkumar S et al. (2019), who demonstrated that the post-isometric relaxation (PIR) technique is useful in helping patients with trapezitis improve their cervical range of motion, reduce pain, and improve their quality of life. In a similar vein, El Laithy mh et al. (2018) and Mona H. El Laithy et al. (2018) found that adding PIR to the regular physical therapy regimen improved cervical range of motion, pain reduction, and functional improvement for persistent non-specific neck pain.

Additionally, Ewan Thomas et al. (2019) found that muscle energy techniques (MET), including both RI and PIR, were effective in treating chronic and acute lower back pain, chronic neck pain, and chronic lateral epicondylitis. However, they noted that other approaches might be more appropriate for directly addressing trigger points. Silvia Sbardella et al. (2021) proposed that muscle energy techniques (MET) might be a beneficial approach for addressing acute or chronic non-specific neck pain, particularly when used alongside conventional rehabilitation methods. However, they stressed the importance of obtaining more robust evidence to thoroughly evaluate the efficacy and safety of MET in clinical practice for managing non-specific neck pain.

This study adds to the body of knowledge by assessing how well post-isometric relaxation (PIR) and reciprocal inhibition (RI) work to treat upper trapezitis. The study provides important insights to improve treatment plans and guide clinical judgement for upper trapezitis and associated musculoskeletal conditions by emphasising the superior outcomes achieved with the PIR approach.

CONCLUSION

The findings show that for people with upper trapezitis, therapies in all groups effectively reduce discomfort and improve functional outcomes. In contrast to individuals in Group A, who received the Reciprocal Inhibition Technique, participants in Group B, who received the Post-Isometric Relaxation Muscle Energy Technique (PIR-MET) in addition to ultrasound therapy, demonstrated more notable gains in their end measures. This implies that the Post-Isometric Relaxation

component of the therapy regimen is more successful in lowering pain and enhancing functional results for patients with upper trapezitis.

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DATA AVAILABILITY

Data can be obtained from the corresponding author upon reasonable request.

CONTRIBUTION DDP –

methodology, investigation, formal analysis, writing - original draft, RK - conceptualization, methodology, supervision, writing, reviewing & editing.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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