

www.jmscr.igmpublication.org

Impact Factor 3.79
ISSN (e)-2347-176x



Journal Of Medical Science And Clinical Research

An Official Publication Of IGM Publication

The Effectiveness of Progressive Resisted Exercises and Kinesiotaping of Lower Trapezius in Reducing Pain and Disability in Subjects Presenting with Unilateral Neck Pain: A Comparative Study

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ABSTRACT

Study Objective: *to compare the effectiveness of progressive resisted exercises and kinesiotaping of lower trapezius in reducing pain and disability in subjects presenting with unilateral neck pain.*

Design: *comparative study.*

Setting: *all the subjects were included from various clinics and hospitals and community in dehradun.*

Method: *a total of 30 subjects were recruited for the study on the basis of inclusion and exclusion criteria after signing the informed consent form. The subjects were divided into two groups (a= delorme and watkins pre along with met & b= kinesiotaping).*

Outcome Measures: *neck disability index and visual analog scale. Results: result of the study showed that although progressive resistive exercises and kinesiotaping were significantly effective but pre was found to*

be more effective than kinesiotaping in reducing pain and disability in patients with unilateral neck pain.

Conclusion: *the present study demonstrates that both techniques in improving the pain and disability in subjects with unilateral neck pain. However it is concluded that progressive resistive exercises is a better choice of treatment in improving pain and disability in subjects with unilateral neck pain.*

Key words: *pre (progressive resistive exercises), met (muscle energy technique).*

INTRODUCTION

Neck pain is a frequent and disabling complaint in the general population.³

Patients with neck pain often have subjective complaints of muscle stiffness, tension or tightness in addition to their pain.^{6,5} Characteristics of scapulothoracic muscle imbalances are found not only in patients with shoulder pathologies but also in individuals with neck pain.⁵ Janda² described muscle imbalances as impaired relationships between muscles prone to tightness that lose extensibility, and those prone to inhibition and weakness. Various authors have also proposed that prolonged tightness or over activity of upper trapezius can lead to middle and lower trapezius muscle weakness, resulting in postural adaptations and pain.⁵ This tightness of the upper trapezius can be addressed by MET according to Janda.¹

Peterson et al.⁵ in their study concluded that participants with unilateral neck pain exhibited significantly less lower trapezius strength on the side of neck pain as compared to the contralateral side. In addition Travel and Simon⁷ stated in their book about myofascial pain that lower part of the trapezius is often the key to successful treatment of upper trapezius.

Razmjou S, Rajabi H et al. (2010)^{10,8} established that the Delorme resistance training method is an efficient protocol in developing muscle strength. Therefore, lower trapezius muscle strength in this population can be addressed by using de Lorme & Watkins PRE scheme.

Kinesio Tape is a relatively unique tape that is capable of stretching up to 130 percent to 140 percent of its resting state, may either be used as a compressive or non compressive external adjunct to rehabilitation, is approximately the same weight and thickness of skin, and has no medicinal qualities.¹² And it has been found that compared to placebo taping, the strength of the lower trapezius has a tendency to increase after kinesiotaping application (P=0.5).⁹ Improvement of muscle strength usually takes place after a period of 4-6 weeks of training. As to the reason why the application of kinesio taping could lead to the marginal increase of the lower trapezius muscle strength immediately has been explained by the results of the facilitated muscle activity & the improved scapular alignment.⁹

The purpose of this study was to compare the effect of both these strengthening techniques over lower trapezius muscle in individuals with

unilateral neck pain, as an initial step in determining which of these strengthening exercises included with MET of upper trapezius can be effective in reducing pain and disability in individuals with unilateral neck pain.

METHODS

30 subjects who were included in a comparative study from various hospitals in Dehradun based on the inclusion and exclusion criteria and they were divided into two groups after an informed consent form was obtained. Pre intervention reading of NDI and VAS were taken for each patient.

15 patients in group A received de Lorme & Watkin's PRE to the lower trapezius along with MET stretch to the upper trapezius, for 6 weeks.

- Each subject performed a standard warm-up for 10 minutes before 10RM testing. 10RM was determined in standard position as described by Kendall et al. Subjects were positioned in prone, with the upper extremity diagonally overhead, in line with the fibers of lower trapezius muscle. Forearm was in mid prone with the thumb pointing towards the ceiling.
- Head turned to the affected side, towel roll was placed under the subject's head to maintain the cervical spine in a neutral position.
- For 10RM test, each subject began by lifting a load in the above position with an interval of 2 minutes.

- Patients performed three sets of 10 repetitions the next day in the same test position: 10 with half of 10 RM, 10 with three fourths of 10 RM, and 10 with full 10 RM. The 10RM was progressed once weekly. The intervention was given 5 times a week for 6 weeks.

In MET to upper trapezius, the patient lie supine, arm on the side to be treated lying alongside the trunk, head/neck side bent away from the side being treated to just short of restriction barrier, while the therapist stabilized the shoulder with one hand and cupped the ear /mastoid area of the same side of the head with other:

- With the neck fully side bent and fully rotated contra laterally, the posterior fibers of upper trapezius are involved in the contraction. This would facilitate stretching of this aspect of the muscle.
- With the neck fully side bent and half rotated, the middle fibers of upper trapezius were involved in the contraction.
- With the neck fully side bent and slightly rotated towards the side being treated the anterior fibers of the upper trapezius were being treated.

The patient introduced a light resisted effort (20% of available strength) to take the stabilized shoulder towards the ear (a shrug movement) and the ear towards the shoulder. The double movement was important in order to introduce a contraction of the muscle from both ends

simultaneously. The contraction was sustained for 10 seconds and the therapist gently eased the head/neck into an increased degree of side bending and rotation, where it was stabilized, as the shoulder was stretched caudally.

Once the muscle was being stretched, the patient relaxed and the stretch was held for 10-30 seconds. The intervention was given 3 times per session, 5 times a week for a total of 6 weeks.

Kinesiotaping of lower trapezius was introduced in group B. The elastic tape was a 5 cm X 28 cm piece of Kinesio tape (Kinesio Tex, KT-X-050, Tokyo, Japan), cut into an Y shape, and applied to envelope the lower trapezius muscle with minimal tension according to the recommendation of Kase (Kase and Wallis, 2002).

The taping was started by placing the base of the Kinesio Y strip at a 45-degree angle towards the inferior angle of the scapula, at approximately the level of the T10-12 spinous processes. Then the patient moved into shoulder abduction and horizontal flexion, and light tension (25 % of available) was applied surrounding the lower trapezius muscle. The tails were then laid down with no tension.

- The kinesiology tape was changed every 4th day. The intervention was given 3 times per session, 5 times a week for a total of 6 weeks.

RESULTS

Data analysis was done using SPSS software (version 14.0). Paired t-test was applied to compare the pre and post intervention readings of VAS and NDI within the groups. Data was analyzed for 28 subjects. The subjects were categorized into 2 groups – Group A and Group B.

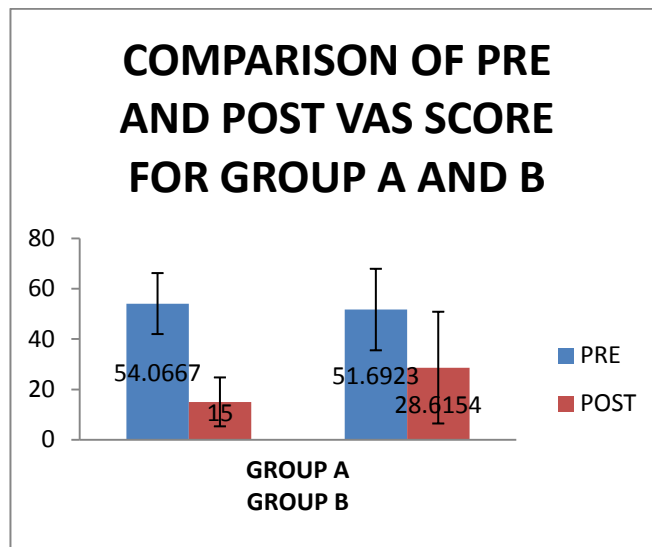


Fig 1.1- Comparison of pre and post VAS score for group A and B

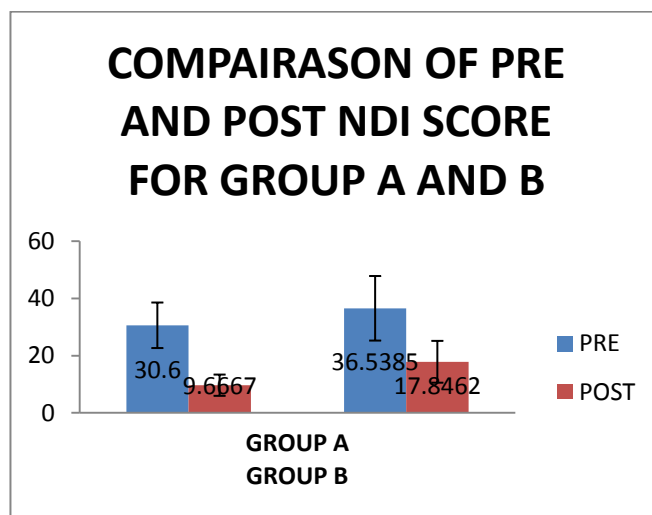


Fig 1.2- Comparison of pre and post NDI score for group A and B

DISCUSSION

The study conducted by Choudhari R et al.¹³(2012) demonstrated that individuals with unilateral neck pain exhibit significantly less lower trapezius strength than middle trapezius than upper trapezius on the side of neck pain compared to the contralateral side. This was also supported by Petersen and Wyatt⁵ that lower trapezius strength is decreased in individuals with unilateral neck pain. Results of the present study depicted that there is a significant reduction of pain and disability in group A after 6 weeks of intervention. MET led to subsequent reduction in tone of the overactive upper trapezius as the neurophysiological principle of post isometric relaxation states that after a muscle is contracted, it is automatically in a relaxed state for a brief, latent period.¹PRE, on the other hand, increased the lower trapezius strength thereby altering the scapulothoracic muscle imbalance. Strength gain by PRE occurred due to neural adaptations (e.g. increased motor unit recruitment, increased rate and synchronization of firing) and adaptation of skeletal muscle structure (e.g. Hypertrophy of type II muscle fibers).⁴Previous research demonstrated that individuals with unilateral neck pain exhibit mild amount of disability due to pain. Kinesiotaping of lower trapezius along with MET of upper trapezius in Group B showed a significant reduction of pain and disability after 6 weeks of intervention. Kinesiotaping leads to a marginal increase of the lower trapezius

muscle strength immediately by the results of the facilitated muscle activity and the improved scapular alignment.¹¹

Kinesiotape produces a concentric pull on the fascia, stimulating increased muscle contraction (Hammer 2006).¹⁵ It had been suggested that Kinesiotape applied under tension in the direction of muscle fibres facilitates the strength of the underlying muscle.¹⁷ Thus, kinesiotaping elevated the lower trapezius activity whereas MET reduced the upper trapezius.

According to Williams et al. (2012) kinesiotaping might have a small beneficial effect on strength. Additional hypotheses suggested that facilitated muscle activity and improved muscle alignment obtained by kinesiotaping may contribute to only a marginal increases in muscle strength.¹⁴ Studies showed that the effects of kinesiotape on strength, movement, range of motion and pain are very small and, for the most part, short lived.¹⁶In a study by Fu T et al. (2008), kinesiotaping applied to skin apparently provided tactile input which has been reported to interact with motor control by altering the excitability of the central neuron system but the negative result of kinesiotaping not altering the muscle performance observed in that study was explained by the fact that the tactile input generated by Kinesiotaping was not strong enough to modulate muscle power of healthy athletes.¹⁸

In the study conducted by Wong et al. (2012), the kinesiotaping was suggested to provide

tactile input and stimulate the cutaneous mechanoreceptors and it was concluded that such stimulation might alter the firing time of the motor neurons, but not be strong enough to enhance muscle strength. They also suggested that the superficial effect of the tape alone is not enough to increase muscle force output, but enough to improve activation.²¹ It had been suggested earlier that kinesiotope may have a small but not statistically significant effect on muscle activation.¹⁹ It is not also known if the increased muscle contraction observed immediately after the positioning of kinesiotope last for a long duration.²⁰ According to Jones, Rutherford, & Parker (1989), in order to enhance the muscle strength, a period of specific overload training would be required to promote neural activation and muscle fiber regeneration which can be well provided by progressive resisted exercise. Thus the above literatures suggested that the strength gains resulting from kinesiotope were very marginal and PRE caused a more increase in lower trapezius muscle strength as compared to kinesiotope and thereby was more effective in reducing the pain in unilateral neck pain patients

Small sample size was the main Limitation of study.

CONCLUSION

The present study concludes that progressive resisted exercise and kinesiotope of lower trapezius are both significantly effective in

reducing the pain and disability of patients with unilateral neck pain.

ACKNOWLEDGMENT

All our best wishes to those valuable subjects & supporter of this study

Conflict of Interest:

We declare that there were no conflicts of interest in the entire journey of the study.

Ethical Clearance: Research Ethics Committee

Source of funding: Self

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