

# Immediate Effect of Kinesiotaping v/s Passive Stretching on Levator Scapulae Muscle in Computer Users with Mechanical Neck Pain

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## ABSTRACT

**Background:** Mechanical neck pain is frequently seen in computer users because of the neck in awkward occupational postures. Changes in alignment of either the scapulae or cervical spine can potentially influence the biomechanics by altering the tension at cervicospinal muscles (levator scapulae) leading to tightness. Kinesiotaping is found to be Effective in: decreasing pain and muscular spasm & increasing range of motion (ROM). Stretching involves the application of manual or mechanical force to elongate structures that have adaptively shortened.

**Objective:** To compare immediate effect of both kinesiotaping and passive stretching of levator scapulae muscle in computer users with mechanical neck pain.

**Method:** 30 subjects having levator scapulae tightness of age group 25 to 35 years were selected. They were randomly allocated into 2 groups of 15 each. Group A received Kinesiotaping and Group B received Passive stretching for the levator scapulae muscles. Pre and post intervention of neck rotation range of motion and NRS scores were analysed.

**Result:** Results showed that there is a increase in range of motion and a significant reduction in pain scores post kinesiotaping and passive stretching in both the groups ( $p < 0.0001$ ). However, intergroup analysis showed that Group A is much more effective in improving the range of motion and reducing pain.

**Conclusion:** The present study concluded that kinesiotaping is a better intervention for releasing tight levator scapulae as it shows significant reduction in pain. Considering effect on cervical rotation range of motion, both kinesiotaping and passive stretching have similar effects, there was no such statistically significant difference seen.

**Keywords:** Kinesiotaping, Passive stretching, Computer users, Levator scapulae, Mechanical neck pain

## INTRODUCTION

Musculoskeletal complaints and pain located in the neck region are commonly reported among computer users. [1] Poor postural habits and neck pain are increasingly common among individuals who work predominately on computer. [2] More than 50% of computer users report musculoskeletal symptoms during the first year after starting a new job. [8]

## MECHANICAL NECK PAIN:

Neck pain without associated trauma is diagnosed as mechanical neck pain chiefly due to poor posture. Mechanical neck pain is frequently seen in computer users because of the neck in awkward occupational postures. Changes in the alignment of either the scapulae or the cervical spine can potentially influence the biomechanics by altering the tension at cervicospinal muscles (levator scapulae) leading to tightness. [2] Individuals with neck

pain may display altered postural behavior when performing prolonged sitting tasks such as during computer use: abnormal scapular posture and any associated changes in axioscapular muscle activity may exacerbate painful neck disorders.<sup>[2]</sup>

Various treatment techniques such as: MET (Muscles energy technique), Neck Mobility exercises, Stretching, Kinesiotaping have been used,

### **KINESIOTAPING:**

Kinesio Taping (KT) has been increasingly used in musculoskeletal conditions which were developed in Japan by Kase and recently it became very popular in pain treatment. Kinesio Tape is a thin, light, and elastic material which does not restrict the joint movement. Although the exact mechanisms of KT are not understood, sensorimotor, proprioceptive feedback mechanisms, inhibitory and excitatory nociceptive stimuli, mechanical restraint were explained as underlying mechanisms. Kinesiotaping technique is found to be Effective in: decreasing pain and muscular spasm, increasing the range of motion(ROM), improving local blood and lymph circulations, reducing edema, strengthen weakened muscles, control joint instability and postural alignment.<sup>[3]</sup> KT of levator scapulae has been found to be effective to reduce neck pain.<sup>[4]</sup>

### **STRETCHING:**

Stretching involves the application of manual or mechanical force to elongate structures that have adaptively shortened and are hypomobile.<sup>[5]</sup> The reduction in the pain following stretching could be due to the inhibitory effects of golgi tendon organs, which reduces the motor neuronal discharges, thereby causing relaxation of the musculotendinous unit and decrease pain perception by resetting its resting length and pacinian corpuscle modification. These reflexes will allow relaxation in musculotendinous unit tension and decreased pain perception.<sup>[6]</sup> The levator scapulae is shortened by bad posture, by raising the shoulder or the shoulder girdle whose symptom is difficulty rotating the

head. Stretching of levator scapulae is effective in relieving pain and reducing disability in patients with mechanical neck pain.<sup>[7]</sup> There is scarcity of literature on the use of these two techniques for treatment of mechanical neck pain and hence this study has been undertaken.

### **Aim & objectives:**

**Aim:** To compare immediate effect of kinesiotaping v/s passive stretching on levator scapulae muscle in computer users with mechanical neck pain.

**Objectives:** To study immediate effect of kinesiotaping on pain reduction using numerical rating scale(NRS) and rotation range of motion using universal goniometer. To study immediate effect of passive stretching on pain reduction using numerical rating scale (NRS) and rotation range of motion using universal goniometer.

To compare immediate effect of both kinesiotaping and passive stretching of levator scapulae muscle in computer users with mechanical neck pain

### **Purpose of study:**

Madeleine et al. conducted a study which showed that musculoskeletal complaints and pain located in the neck region are commonly reported among computer users.<sup>[1]</sup>

Saime Ay et al. conducted a study which showed Kinesiotaping of levator scapulae has been found to be effective to reduce neck pain<sup>[3]</sup>

Apoorva Phadke et al. Axioscapular muscle Stretching is effective in relieving pain and reducing disability in patients with mechanical neck pain.<sup>[6]</sup>

Very few studies have been conducted on the effect of kinesiotaping v/s passive stretching in mechanical neck pain on levator scapulae muscle in computer users. Hence this study is an attempt to compare the immediate effect of kinesiotaping and passive stretching of levator scapulae muscle in computer users with mechanical neck pain.

## MATERIALS AND METHODS

The study was a comparative study where 30 computer users were selected using random sampling. Inclusion Criteria: Patients willing to participate, Computer users with neck pain, Patients with levator scapulae tightness (restricted cervical rotation range of motion), Age group: 25-35 yrs, Duration of work: 1 year or more, Working hours: 6 hours or more, NRS: 3 or above/10. Exclusion criteria: Patients with disc and nerve involvement, Patients with traumatic injury, Upper limb fracture or any surgical cases, Patients with neurological or cardiovascular problems. Materials used in the study included Kinesiotape, Scissor, Universal goniometer, Paper, Pen, Chair.

### Procedure:

An informed written consent was taken from the subject in the language best understood by them. Selection of the subjects was done as per the inclusion and exclusion criteria

The subjects were divided into 2 groups, A and B, of 15 each

GROUP A- Kinesiotaping

GROUP B- Passive stretching

Pre assessment was done of :

1. Pain using NRS
2. Cervical rotation range of motion using universal goniometer
3. Tightness of levator scapulae muscle

**GROUP A-KINESIOTAPING:** The taping was done to levator scapula muscle. The shoulder was depressed and neck kept in lateral flexion and rotation position to the opposite side. A 15–20 cm long “I” strip was used. Application started from the superior scapular angle. Initial portion of the tape was stretched maximum 4–5 cm and then it was stuck on the muscle origin which was at the level of 1–4 thoracic transverse process without stretching.



Figure 1: Kinesiotaping of levator scapulae muscle

### GROUP B-PASSIVE STRETCHING:

Patient was made to sit on a chair and made sure that he doesn't hunch back. Patient was asked to make the ipsilateral hand reach behind and grab the edge of the chair. Head was rotated 45 degrees to the contralateral side and force was applied to flex the neck in the same direction. Muscle was stretched in this manner for 30 seconds of 3 sets. Each set was followed by rest interval of 5-10 seconds.



Figure 2: Levator scapulae stretching

Both the groups were given conventional Physiotherapy treatment which included: Hot Pack, shoulder girdle exercise, neck mobility exercises, chin tucks and stretching of trapezius muscle. Immediate post

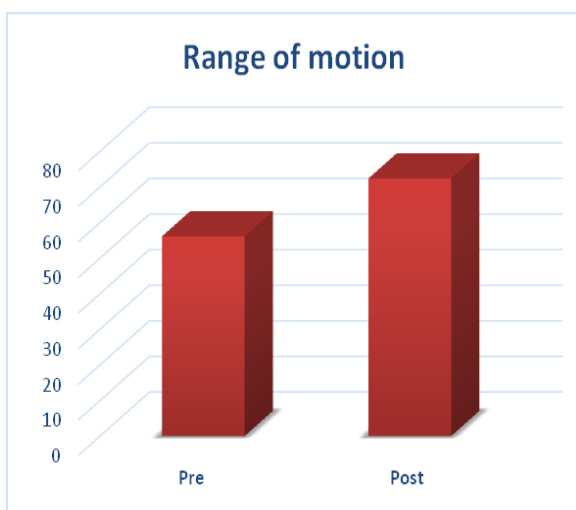
assessment for both the groups was done by measuring the neck rotation range of motion using half circle goniometer and pain intensity using NRS. The data was then statistically analysed.

### STATISTICAL ANALYSIS:

Collected data was entered in Microsoft Excel and Graph Pad Prism 8.3.1 was used for the data analysis. Normality (Kolmogorov-Simonov) test was done for Range of motion and Numerical rating scale (NRS) of both groups. Since the data for Range of motion was normally distributed, parametric test (Paired t test) was done for within group comparison and Since Data for NRS was not normally distributed Wilcoxon test was done for within group comparison. For inter group comparison unpaired t test and Mann-Whitney test were done for Range of motion and Numerical rating scale (NRS) respectively.

### RESULTS

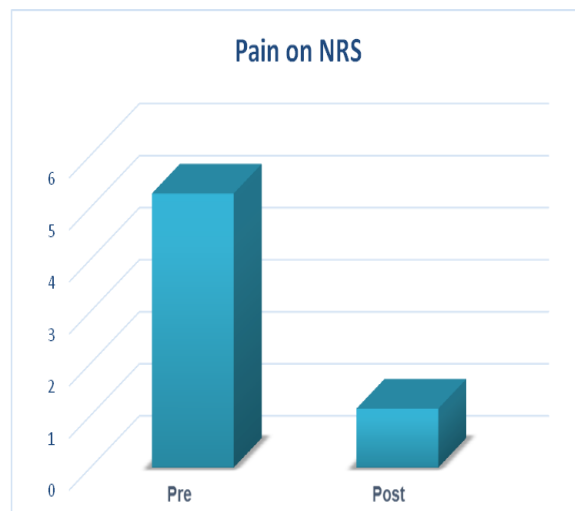
The result of Mann Whitney test for inter-group comparison shows that kinesiotaping is statistically more significant in improving the pain scores when compared to passive stretching ( $p < 0.0001$ ). Considering effect on Range of motion, none was superior to another.



Graph 1: Comparison of pre and post neck rotation range of motion following kinesiotaping for levator scapulae muscle.

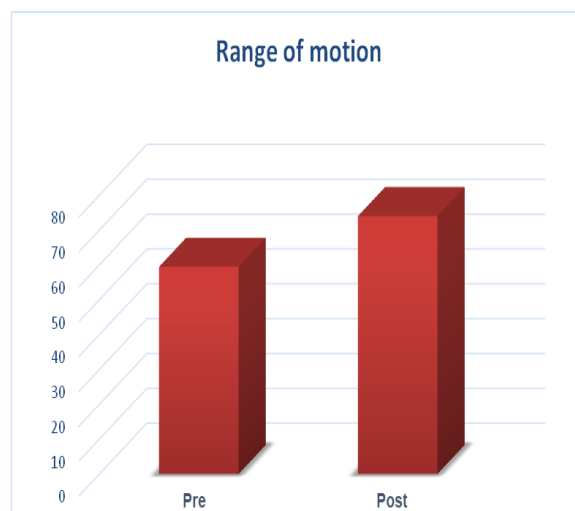
The above graph shows that there was a significant increase in the neck rotation

range of motion following kinesiotaping ( $p < 0.0001$ )



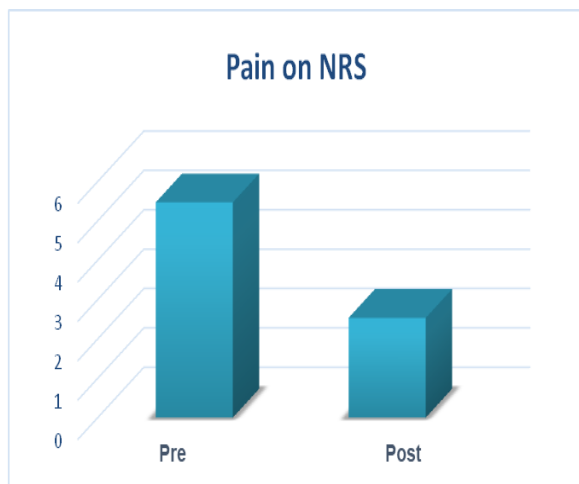
Graph 2 : Comparison of pre and post pain scores on NRS following kinesiotaping of levator scapulae muscle.

The above graph shows that there was a highly significant reduction in the pain scores following the application of kinesiotape ( $p < 0.0001$ )



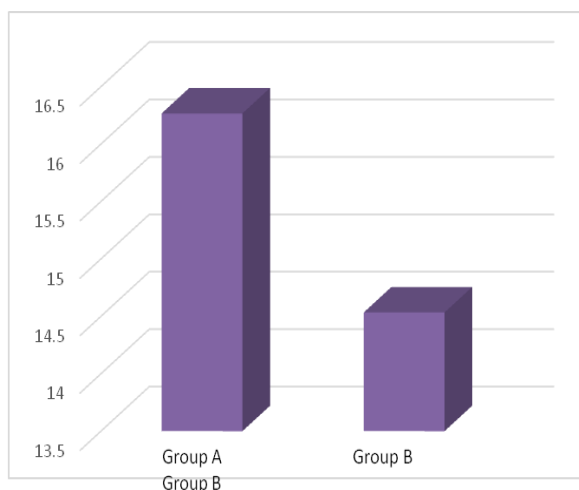
Graph 3 : Comparison of pre and post neck rotation range of motion following Passive stretching of levator scapulae muscle

The above graph shows that there was a significant increase in the neck rotation range of motion following passive stretching ( $p < 0.0001$ )



Graph 4 : Comparison of pre and post pain scores on NRS following Passive stretching of levator scapulae muscle

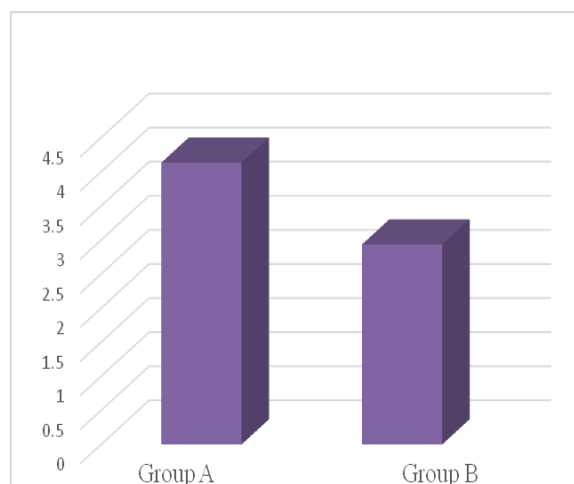
The above graph shows that there was a significant reduction in the pain scores following passive stretching ( $p < 0.0001$ )



Graph 5 : Comparison of Range of Motion following kinesiотaping and passive stretching of levator scapulae muscle.

GROUP A – Kinesiотaping GROUP B – Passive stretching

The above graph shows that when both the groups were compared, Group A showed a greater increase in the neck rotation range of motion when compared to Group B with a p value 0.1034 but when statistically analysed there was no significant difference seen.



Graph 6- Comparison of Pain on NRS following kinesiотaping and passive stretching of levator scapulae muscle.

GROUP A –Kinesiотaping GROUP B – Passive stretching

The above graph shows that there was a highly significant reduction in pain scores in Group A when compared to Group B ( $p: 0.003$ )

## DISCUSSION

30 subjects having levator scapulae muscle tightness of age group 25 to 35 years were selected. They were randomly allocated into 2 groups of 15 each. Comparison of Kinesiотaping and Passive stretching of levator scapulae muscle by assessing the neck rotation range of motion and pain score on NRS was done. The data was collected and analysed using the non-parametric tests (Wilcoxon and Mann-Whitney).

Graph 1 shows that there is a significant increase in the pre (Mean=56.133) and post (Mean=72.4) neck rotation range of motion after the application of Kinesiотaping technique in Group A (Kinesiотaping) ( $p < 0.0001$ ). This finding is consistent with the study from Saime Ay et al 2017 which showed that Kinesiотaping leads to improvements on pain, pressure pain threshold and cervical range of motion, but not disability in short time. [3]

Graph 2 shows that there is a significant reduction in pre(Median=5) and post(Median=1) pain scores on NRS after



the application of Kinesiotaping technique in Group A(Kinesiotaping)( $p < 0.0001$ ). This finding is supported by the study of El-Abd AM et al J Sports Med Phys Fitness which concluded that KT has been found to be more effective than postural exercises to reduce neck pain. [4]

Graph 3 shows that there is a significant increase in the pre (Mean=59.46667) and post(Mean=74) neck rotation range of motion after the application of Passive stretching technique in Group B( $p < 0.0001$ ). The study done by Richa Mahajan et al concluded that both the treatment techniques static stretching was effective in alleviating the mechanical neck pain in terms of decreasing pain intensity and increasing active cervical range of motion supporting the current finding. [5]

Graph 4 shows that there is a significant reduction in pre (median=5) and post(median =3) pain scores on NRS after the application of Passive stretching technique in Group B( $p < 0.0001$ ). This result is consistent with the finding in the study carried out by Apoorva Phadke et al. Hong Kong Physiotherapy Journal which concluded that both MET and stretching are effective in relieving pain and reducing disability in patients with mechanical neck pain. [6]

According to the interpretation of the data in graphs 5 and 6, both the groups when compared, Group A i.e. Kinesiotaping shows a greater increase in the cervical rotation range of motion. Elastic property of tape induces vertical lift of skin and myofascial tissue which decompresses capillary bed and space between skin and muscles, decompression promotes blood and lymphatic flow. When a kinesiotape is applied from insertion to origin of an overused (spasm) muscle with tape and muscle stretched, there is a recoil from origin to insertion of the same tightened muscle, for which the inhibitory pattern is correlated with the Golgi tendon organ (GTO) located at muscle-tendon junction in the insertion end. These include compressing the muscle-tendon junctions

and keeping tendon in stretched condition. GTO, sensitive to changes in muscle tension, connects to muscle fibers and communicates the muscle spindle status. When in action, GTO inhibits its own muscle, excites the antagonist and relaxing the muscle taped, hence increasing the range of motion. These findings were in agreement to Pranali Sannake who performed a study on Effect of kinesiotaping with conventional therapy on pain, cervical ROM and function in myofascial pain syndrome of upper trapezius muscle and found that Kinesiotaping is effective in relieving pain and improving cervical ROM and function for Myofascial pain syndrome of the upper trapezius muscle. [9]

Also, when the pain scores on NRS were compared, a significant difference was observed in both the groups with Group B showing a greater reduction in pain when compared to Group A ( $p < 0.0001$ ). Stimulating the gate control mechanism, there results a decrease in pain through the increase in afferent feedback found in the skin. Another theory suggests that the improved ROM and pain are due to an increased proprioceptive feedback mechanism and muscle facilitation. KT method elevates the space under skin and soft tissue, so that the space for movement can be enlarged, the circulation of blood can be facilitated, and healing rate of tissue can be increased. There is a positive effect on opening of microvalves due to dynamic pressure variation. Since periodic compression and decompression to superficial and deep lymphatics, through expansion and contractile properties of the tape during active movement, the flow and circulation improves, brushing out the pain producing nociceptors, hence alleviating pain. A study conducted by Zeliha Başkurt on Short Term Effects of Kinesiotape Application in Patients with Knee Osteoarthritis concluded suggests that Kinesiotape is a short-term treatment option that can be preferred for relieving pain. [10]

On basis of statistical reference, the present study supports the previous studies on levator scapulae muscle stating that kinesiotaping and passive stretching both individually show a significant increase in cervical rotation range of motion as well as a reduction in pain intensity.

In this study, statistically significant difference in comparison of immediate effect of kinesiotaping and stretching of levator scapulae muscle was found with respect to pain since kinesiotaping provides immediate effects on relief of pain by decompression of tissues. The muscle spindles are sensitive to change in tension and subsequent increase in the blood supply help wash off the pain producing metabolites.

Also, statistically significant difference wasn't found in terms of ROM in comparison of immediate effect of kinesiotaping and stretching of levator scapulae muscle since long term effects were not taken into consideration or the inclusion criteria.

The current study aimed at the comparison of the immediate effects on pain and cervical rotation ROM following kinesiotaping and passive stretching. The inter-group analysis concluded that Kinesiotaping is much more effective for pain scores when compared to passive stretching and hence it can be applied in clinical practice. In terms of effect on the range of motion, both have similar effects, none is superior to another.

The main limitation of the study was that it was performed on a small sample size and only the immediate effect on range of motion and pain was taken into consideration rather than the long term effect.

Future studies can take into consideration the long term effect of kinesiotaping on the levator scapulae muscle and also consider various age groups of computer users.

## CONCLUSION

The present study on immediate effect of kinesiotaping and passive stretching of levator scapulae muscle in computer users with mechanical neck pain concluded that kinesiotaping is a better intervention as it shows a significant reduction in pain. Considering effect on cervical rotation range of motion both kinesiotaping and passive stretching have similar effects, there was no such statistically significant difference seen.

### Clinical Implication:

Treatment can be modified and application of tape can be used for clinical improvement

Taping can be used as an adjunct to an ongoing exercise program.

Taping can be used to improve neck range of motion and alleviate pain.

### Abbreviations

ROM: Range Of Motion

NRS: Numerical Rating Scale

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