

Effect of Laser v/s Kinesio Taping on Trigger Points in the Upper Trapezius Muscle

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Abstract: *Background:* The Trapezius muscle is one of the major muscles to undergo a lot of stress throughout the entire day, be it sitting in front of a computer, carrying heavy backpacks, bending over a table, moving boxes using improper mechanics are amongst the common causes to form Trigger points in the upper trapezius muscle. It causes neck pain which leads to reduced range of motion, headache and affects the quality of life of an individual. Laser and Kinesio Taping are common modes of treatment used to relieve pain over a trigger point and studies have proved that they are effective modes of treatment. However, studies comparing the effect of Laser and Kinesio Taping have not been done. Hence the study was undertaken to determine which treatment technique is more effective. *Methods:* 40 Individuals with Trigger points were selected as per the inclusion and exclusion criteria and randomly divided into two groups using GraphPad QuickCalcs. Group 1 received Laser along with neck isometrics. Group 2 received Kinesio Taping with neck isometrics. The outcome measures pain intensity using NRS and Cervical range of motion using measuring tape. *Results:* On performing analysis, it was found that both groups were statistically significant in reducing pain on NRS. Both groups were also statistically significant in improving the Cervical ranges. On comparison between the groups, both groups were statistically equally effective in reducing pain and improving the Cervical ranges of motion. *Conclusion:* Laser and Kinesio Tape are both equally effective in relieving pain and improving Cervical ROM.

Keywords: Laser, Kinesio Tape, NRS, Cervical Range of Motion.

1. Introduction

Trapezititis is an inflammatory condition, which causes pain in the Trapezius muscle, leading to severe neck spasm and development of trigger points around the neck. The pain can be felt all along the muscle. This is a highly disabling condition, which greatly prevents a person from leading a normal life.

Trigger Points are small, circumscribed, hyperirritable foci in muscles and fascia, often found within a firm or taut band of skeletal muscle, mainly diagnosed clinically and by physical examination involves muscle palpation⁸. It is described as tender nodes of degenerating muscle tissue that can cause local and radiating pain. Trigger Points develop under prolonged period of spasm, tension, stress, fatigue and chill. They occur mainly in axial muscles due to constant tension and microtrauma of poor postural habits. Trigger points are classified as being active or latent, depending on their clinical characteristics⁹. An active Trigger point causes pain at rest. It is tender on palpation with a referred pain pattern that is similar to the patient's pain complaint. A latent Trigger point does not cause spontaneous pain, but may restrict movements or cause muscle weakness⁹. The patient presenting with muscle restriction or weakness may become aware of pain originating from a latent trigger point only when pressure is directly applied over the point.

Laser therapy is a commonly used mode of treatment for trigger points. Laser is an acronym for 'light amplification stimulated emission of radiations'¹³. The laser beam is produced when the atoms of certain elements are excited by electromagnetic radiations and as a consequence produce electromagnetic radiation of a particular wavelength themselves. The most common type of Laser has a hand-

held applicator like a pen, which is placed over the affected tissue at a right angle for maximum effect^{13,14}.

Kinesio taping is a therapeutic taping technique developed by Dr. Kenzo Kase(Japan, 1979)⁴. This technique uses an elastic tape that is thin and more elastic than conventional bandages. The tape can be stretched to 140% of its original length and applied to the skin.

According to studies done with Laser therapy, it has been shown that it helps in improving the microcirculation and the oxygen supply over the affected area and at the same time help in removing the accumulated waste products^{7,8,9,13,14}.

Kinesio Taping helps unload the affected soft tissue i.e. inhibiting overactive muscle, changing orientation of fascia and proprioceptive effect. Spacing method helps reduce tissue tension and increase blood supply to that area^{4,5}.

Laser and Kinesio Taping are common modes of treatment used to relieve pain over a trigger point and studies have proved that they are effective modes of treatment. However, studies comparing the effect of Laser and Kinesio Taping have not been done.

2. Methodology

Materials to be used

- 1) Measuring Tape
- 2) Laser machine(Laser beam: 3B, Wavelength: 650 nm; Semiconductor Ga As)
- 3) Plinth, Chair with arm rest and back support, pillow.
- 4) Two pairs of goggles.
- 5) Kinesio Tape (NITTO DENKO)
- 6) Spirit, Cotton gauze.

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7) A pair of Scissors.

Study Design

- 1) Type of study: perspective comparative study
- 2) Sample size: 40 [2 groups of 20 subjects]
- 3) Setting: tertiary healthcare centre
- 4) Sampling method: simple random sampling using graphpad quickcalcs.
- 5) Source: population of subjects with latent trigger points.
- 6) Study duration: 4 months



Figure 1: Laser Machine



Figure 2: Kinesio Tape



Figure 3: Scissors



Figure 4: Measuring Tape

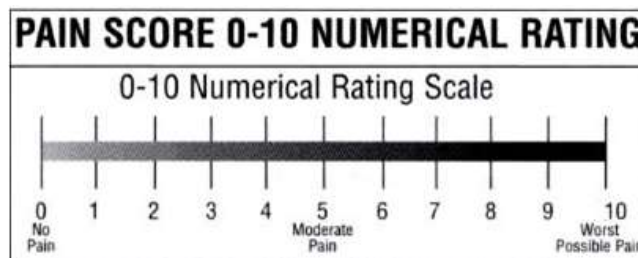


Figure 5: NRS Pain Scale

Inclusion Criteria:

- 1) AGE GROUP: 18-35 years
- 2) Both Males and Females.
- 3) NRS>3

Exclusion Criteria:

- 1) Recent h/o fall or trauma.
- 2) Neurological involvement.
- 3) Individuals with cervical or shoulder pathology.
- 4) Allergic to Kinesio Tape.
- 5) Pregnancy or Malignancy.

Outcome Measures

- 1) Numerical Rating Scale (NRS)
- 2) Cervical ranges of motion (Cynthia Norkins; Reliability- 0.90)

Method:

Individuals with Trigger points were selected as per the inclusion and exclusion criteria and randomly divided into two groups using GraphPad QuickCalcs. Group 1 received Laser along with neck isometrics. Group 2 received Kinesio Taping with neck isometrics. A written consent was taken prior to start of treatment. The necessary assessment was done before the start of the intervention and after the completion of intervention. Assessment included pain measurement as per the Numerical Rating Scale(NRS) and Cervical range of motion using measuring tape. After the completion of the study the data collected was used for statistical analysis. The comparison within the groups was done using 'paired t test' when data passed normality and 'Wilcoxon's test' was used where data did not pass normality. The comparison between groups was done using 'unpaired t test' when data passed normality and 'Mann-Whitney test' was performed when data did not pass normality.

Group 1

Treated with Laser- 650 nm semiconductor GaAs
 Duration- 1 minute per Trigger point
 Position of subject- Sitting on chair with head resting on plinth supported by pillows.
 Position of Therapist- Standing behind the subject.
 Number of sessions- 5 consecutive days

Group 2

Treated with Kinesio Taping
 Duration: 1 application for 48 hours.
 Position of the subject: Sitting on chair with adequate back support.
 Position of the therapist: Standing behind the subject.
 Method: Approximation/ Spacing Method.
 Number of sessions: 2 i.e 4 days.



Figure 6: Laser Therapy for Trigger point



Figure 7: Kinesio Taping [Approximation Method]

Outcome Measure:

Before the start of the intervention written consent was taken from the subjects and randomly divided into 2 groups .group 1 laser group and group 2 kinesio taping group. Subjects were assessed start of the intervention and end of the intervention for pain intensity using Numerical Rating Scale and cervical Range of Motion using measuring tape.Both the groups were given neck isometric Exercises

3. Results

After the completion of the study the data was entered using Microsoft Excel 2010 and analysed using GraphPad Prism 7 software. The comparison within the groups was done using 'paired t test' which is used for data following normality, Wilcoxon test was used for data not following normality and comparison between groups 'unpaired t test' was used for data following normality, and Mann-Whitney test was used for data not following normality

Table 4: Comparison of Cervical Flexion and Cervical Extension within the Group

	Flexion range of motion					Extension range of motion				
	Pre intervention		Post intervention			Pre intervention		Post intervention		
	Mean	SD	Mean	SD	P value	Mean	SD	Mean	SD	P value
laser	5.675	1.704	4.655	0.9741	0.0028	18.62	2.283	19.62	1.939	<0.0001
k-tape	5.35	1.496	4.5	0.8272	0.0017	17.56	2.157	18.76	2.13	0.0004

Table 4 shows, there is clinical improvement in flexion and extension range but statistical improvement in extension range.

Table 5: Comparison of Cervical Flexion and Cervical Extension Range of Motion between the Group

	Cervical Flexion			Cervical Extension		
	Mean Difference	Standard Deviation	P-Value	Mean Difference	Standard Deviation	P-Value
LASER	1.02	1.331	0.6552	0.995	0.7964	0.7643
K-TAPE	0.85	1.04		1.095	1.258	

4. Findings

The data was entered using Microsoft Excel 2010 and analysed using GraphPad Prism 7 software. The following statistical tests of significance were used:-

- For comparison of data within the group,
 1) 'Paired t test' was used for data following normality.
 2) Wilcoxon test was used for data not following normality.

- For comparison of data between the groups,
 1) 'Unpaired t test' was used for data following normality.
 2) Mann-Whitney test was used for data not following normality.

A significance level was set at 95% confidence level for all statistical parameters (p<0.05)

Table 1: Demographic distribution of subjects

Groups	Age	Sex	
		Male	Female
laser	20.95	0	20
k-tape	21.9	1	19

Table 2: Numerical Rating Scale (NRS) within the groups

	Within Group		S.D		P value
	Pre	Post	Pre	Post	
Laser	6.7	2	1.418	1.487	<0.0001
KT	6.8	2.25	1.105	1.552	<0.0001

From table 2 it is seen that, when compared within the group, both laser and kinesio tape are statistically extremely significant(p-value <0.0001) to improve pain on the NRS scale.

Table 3: Numerical Rating Scale (NRS) between groups

Between Groups		
	Laser	KT
Mean Difference	4.7	4.55
SD	1.302	1.317
P value	0.4015	

From the above table 3 it is seen that, when compared between groups, both laser and kinesiotape are statistically non significant but clinically effective to improve pain on the NRS scale.

From the table 5 seen that when compared between the groups both laser and kinesio tape are clinically significant on flexion and extension range of motion but statistically non significant

Table 6: Comparison of Cervical Lateral Rotation and Lateral Flexion Range of Motion Within the Groups

Right Lateral Flexion			Right Lateral Flexion		Left Lateral Rotation		Left Lateral Rotation	
Pre Intervention			Post Intervention		Pre Intervention		Post Intervention	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
laser	11.71	1.462	10.68	1.291	11.97	1.403	10.93	0.9239
k-tape	13.36	2.715	12.01	2.167	14.16	2.673	12.81	2.253
p-value	<0.0001		<0.0001		<0.0001		<0.0001	

From the above table 6 it is seen that, when compared within the groups, both laser and kinesiotape are clinical and statistical improvement in lateral rotation ad lateral flexion

Table 7: Comparison of cervical lateral rotation and latreal flexion between the groups

Right Lateral Flexion				Left Lateral Flexion			Right Lateral Rotation			Left Lateral Rotation		
	MD	SD	P	MD	SD	P	MD	SD	P	MD	SD	P
laser	1.03	0.848	0.27	1.045	0.8451	0.2725	0.59	0.7732	0.7115	0.515	0.8719	0.8532
k-tape	1.4	1.211		1.355	0.9145		0.75	1.275		0.57	0.9911	

from the table 7 shows that when compared between the groups, both laser and kinesio tape are statically non significant but clinically effective to improve right, left lateral rotation and right, left lateral flexion MD-mean difference; SD-standard deviation p-value

5. Discussion

This study was conducted to compare the effects of Laser and Kinesio taping on Trigger points in the upper trapezius muscle on the level of pain and changes in the Cervical range of motion. During the study it was noticed that patients reported reduction in pain on NRS as well as increased flexibility in their Cervical ranges.

Results of the study revealed that:

- In Group 1(Laser) and Group 2(KT) there was statistically significant improvement in pain on NRS.
- On comparison of means between the groups , they were statistically equally effective in pain reduction.
- There was statistically significant improvement in the Cervical ranges in Groups 1 and 2.
- On comparison between the groups, both were statistically equally effective in improving the Cervical Ranges of motion.

Simunovic Z found that the mobility is restored, and the induced pain reduces or disappears on administering LLLT. He found that LLLT improves microcirculation and it also improves Oxygen supply to hypoxic cells in the Trigger point areas and at the same time it can remove the accumulated metabolic waste products^[7].

Luciana Uemoto et al reported greater efficacy of laser over dry needling. It has been suggested that administration of laser therapy improves microcirculation which may favour the supply of Oxygen to the cells under Hypoxia condition and help remove the the waste products of cell metabolism, thereby breaks the vicious cycle of pain, muscle spasm and further pain^[8].in case of patients who has fear of needling,laser is the best choice of treatment.

Laser provides an analgesic, anti-inflammatory and tissue healing effect by increasing pain threshold in sensory nerve

endings, by stimulating the electrolyte exchange in the cell protoplasm and thus increasing the metabolism^[10]. In addition to this, Laser irradiation stimulates collagen production, alters DNA synthesis and improves the function of damaged neurologic tissue.

Tomasz Halski et al reported that, kinesio taping helped to increase the blood and lymphatic fluid circulation, which helped in increasing the Oxygen supply to the area and removed the accumulated metabolic waste products which helped in reducing the pain. They also suggested that, the cutaneous stretch stimulation, activated by the kinesio tape, can interfere with the noicceptive stimuli reaching the central nervous system and inhibit the pain^[4,5].

The lifting effect, caused as a result of the tape helps in creating a wider space between skin and muscle, which helps in improving the range of motion^[2,4,5].

In a study conducted by **Sowmya M. V**, it was reported that isometric neck exercises helped in reducing neck pain, improve neck mobility and improve muscle performance^[11,12].

6. Conclusion

The study suggested that both Laser and Kinesio taping are equally effective in the treatment of trigger points in the upper trapezius muscle. They were equally effective in improving pain on NRS also Cervical Ranges of Motion.

7. Findings

The data was entered using Microsoft Excel 2010 and analysed using GraphPad Prism 7 software. The following statistical tests of significance were used:-

- For comparison of data within the group,
 - 'Paired t test' was used for data following normality.
 - Wilcoxon test was used for data not following normality.
- For comparison of data between the groups,
 - 'Unpaired t test' was used for data following normality.

- Mann- Whitney test was used for data not following normality.

A significance level was set at 95% confidence level for all statistical parameters ($p < 0.05$)e level for all statistical parameters ($p < 0.05$).

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